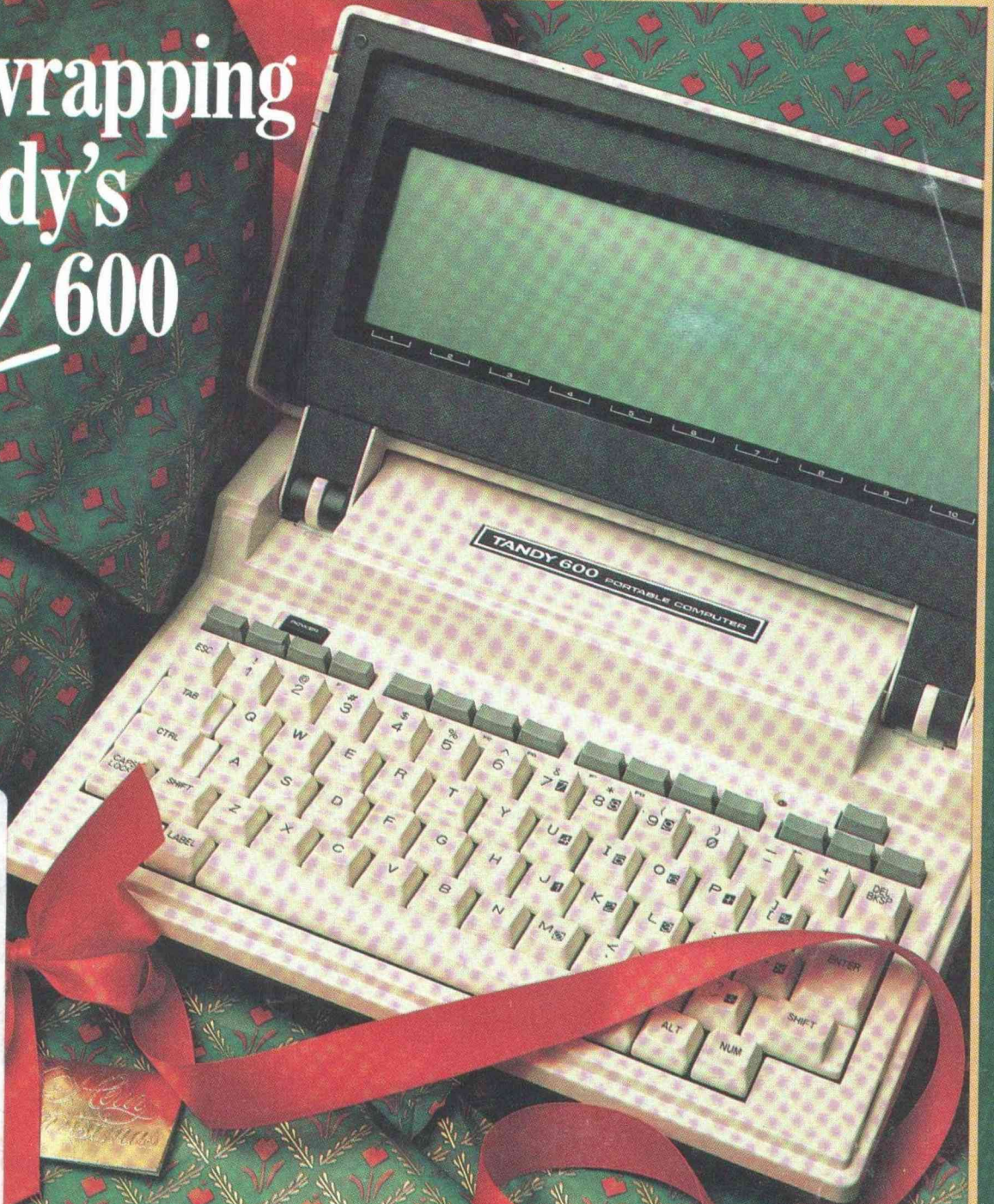


# portable

100/200/600 TANDY BRIEFCASE COMPUTING

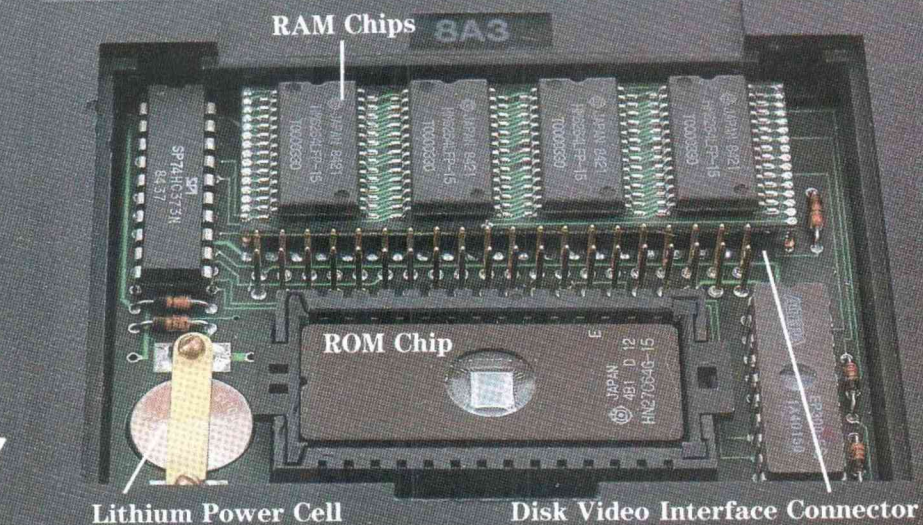
Unwrapping  
Tandy's  
*New* 600



DD04\*93406MUIRPO\*BOX5 DEC86  
E MUIR  
PO BOX 14334  
SAN LUIS OBISPO CA 93406



# State of The Art RAM Technology

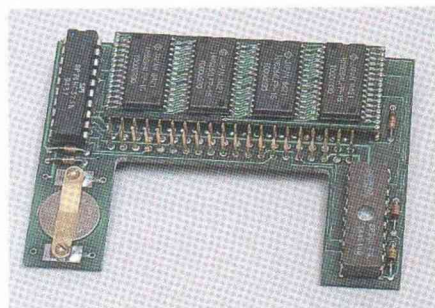


## At last, a 96K Model 100!

**"The new PG Design RAM should be in every Model 100 built!"**

### Miniaturized Technology

Our miniaturized RAM chips are state of the art. They are the most advanced memory chips found anywhere in the world. Their tiny size allows us to keep a low profile in the expansion port of the Model 100. We use a technique called *vapor phase soldering* to ensure that each and every tiny connection is clean — perfect.



*The RAM module is precision constructed.*

### Like The Original

Each 32K RAM bank has its own command of the software that comes in your Model 100. BASIC, TEXT, TEL-COM, ADDRSS, SCHEDL are all there in each bank and you can use them as you would in the original bank. Each bank can be accessed from any of the other banks. We even have an optional data transfer program

which allows data to be transferred from one bank to any other bank. It's flawless!

### Simple Installation

"Adding this 64K RAM module to your Model 100 is as easy as putting in new batteries." Once you've removed the expansion cover on the back of your Model 100, just snap the **PG Design** RAM module in. You can't get it wrong! The pins line up perfectly with the expansion holes in the Model 100 compartment. Snap the cover back on and turn your Model 100 over. Turn it on and enter BASIC. Type in the one line program we supply you and presto—you've got a Model 100 with 96K of RAM. You do not need a 32K Model 100 to utilize the **PG Design** 64K RAM module.

### No Need To Remove It

The beauty of this RAM module is that we've enabled you to have a Model 100 with 96K of RAM and we've given you access to the other Model 100 options within the expansion compartment. The DVI connection can be made easily with our rugged connectors. Gone are the flat flimsy pins. And best of all, the ROM slot is clear to insert any ROM modules, (like Tandy's Multiplan on ROM). We designed this RAM module so it wouldn't ever have to be removed from your Model 100. But, if you should remove it, we've installed a lithium

power cell that will keep all the data on the module intact for six months outside the Model 100. Six months! The actual life span of the lithium power cell while in the Model 100 is nearly six years!

### Guarantee

We stand behind all the products we manufacture at **PG Design**. If you are not completely satisfied with your purchase, call us! If we cannot solve your problem, return the product to us and we will refund your money. We are positive that you will be completely satisfied with all our products.

### Order Today

64K RAM module — \$375

32K RAM module — \$250

If you want only a 32K version of the RAM module, you may upgrade later for only \$150. The 32K version is constructed exactly as the 64K module.

Data Transfer Program — call

Call us at 313/727-2744, or write. We accept Visa and MasterCard, as well as check or money orders. We ship within five days of receiving your order.

**Dealer Prices Available**

TRS-80 is a trade mark of Radio Shack

**PG DESIGN ELECTRONICS, INC.** Micro-Computer Peripherals

66040 Gratiot, Richmond, Mich. 48062 (313) 727-2744

Circle 39 on Reader Service Card



Traveling Software  
introduces everything you would ever want on a  
single plug-in ROM chip . . .

# THE ULTIMATE ROM

ONLY  
**\$169<sup>95</sup>**  
while supplies  
last!

## WE SET THE STANDARD

With the ULTIMATE ROM, Traveling Software set the standard for packing the most powerful software applications into a single ROM chip. Now, while supplies last, you can purchase this widely acclaimed product for only \$169.95 — with a 30-day money-back guarantee. Later, if you wish, you can upgrade to the ULTIMATE ROM II for just \$49! Who said you can't eat your cake and have it too? Our supplies of the ULTIMATE ROM won't last long. Call now; orders will be filled on a first-received basis.

The ULTIMATE ROM contains three acclaimed programs:

**IDEA!** — One of the hottest-selling programs for the Model 100 and NEC PC-8201! Organizes anything from simple lists to complex outlines. Easily reorganizes and searches. Offers many word processing and database capabilities. Develops outlines from rough drafts into finished documents.

**Original cassette price: \$79.95**

**T-BASE** — The database reviewers have rated as number one for the Model 100! Lets you design relational databases and set up screen files. Borrows information from fields in other databases. Performs math computations. Creates custom-printed or LCD display reports. **Original cassette price: \$99.95**

**T-WRITER** — Still the favorite text formatter with owners of the Model 100 and NEC PC-8201. Prints documents created using the built-in TEXT program. Includes justification, headings, footings, underlining, italics, boldface, and more. Produces form letters and mailing labels. Word-Star-like command.

**Original cassette price: \$49.95**

**ADDED MEMORY** The ULTIMATE ROM adds another 32K to your computer's memory by storing programs outside precious RAM memory space, freeing RAM for larger data files.



**ADDED CONVENIENCE** With the ULTIMATE ROM you don't need to load programs individually, either. Simply plug in the chip and you're always ready to work — without using slow, clumsy cassette recorders.

The ULTIMATE ROM also works with other memory expansions, like PG Design's 64K RAM module or Purple Computing's NEC SideCar. The ULTIMATE ROM works in any active memory bank on your computer — no need to copy programs from bank to bank.

Now available through Radio  
Shack stores by express order:

Product Numbers:  
M100 90-0409  
M200 90-0410



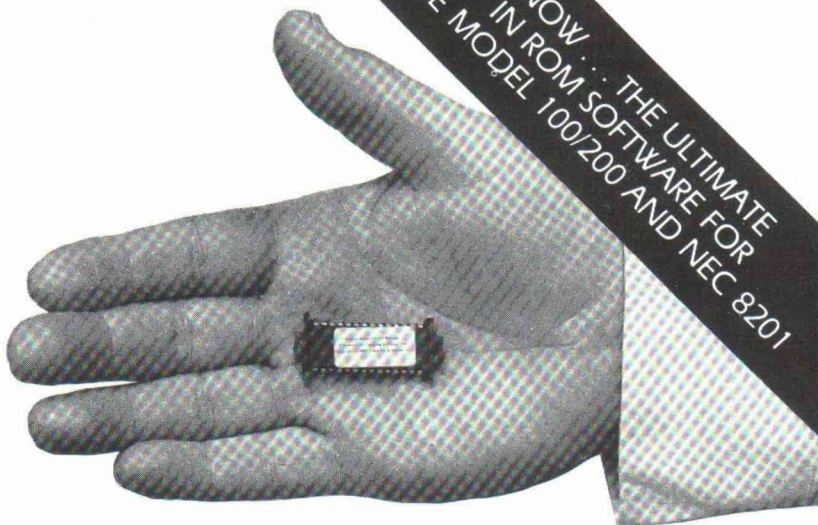
TM

To order call toll free 1-800-343-8080  
For technical information call (206) 367-8090

Traveling Software and the Traveling Software logo are registered trademarks of Traveling Software, Inc.  
Guardian Rom copyright 1985 PEAC  
IDEA! is a trademark of Microsoft International Corp.

Traveling Software, Inc.  
11050 Fifth Avenue, N.E.  
Seattle, WA 98125

NOW... THE ULTIMATE  
IN ROM SOFTWARE FOR  
THE MODEL 100/200 AND NEC 8201





# portable

## 100/200/600

DECEMBER 1985

VOLUME THREE, NUMBER FOUR



### ON THE COVER

#### TANDY TAKES THE HIGH ROAD.....19

They already have the largest selling personal portable; now Tandy is taking on the business market with the Tandy 600. It comes with a powerful word processor, spreadsheet, file manager and more. It may be what users need, but is it what they want?

*Cover Photo by Benjamin Magro*

### ARTICLES

#### A HIGH-TECH HEARING TEST.....9

How you stack up against your pet and the U.S. Navy

#### A CLOCK-WORK TANDY.....28

Killing time with your laptop

#### BUGS AND SECRET FEATURES OF MODEL 100 BASIC .....38

Minor details that Tandy neglected to tell us

#### NAVIGATING WITH YOUR 100.....40

Programming your portable direction finder

#### HOLIDAY MIXINGS.....44

A 20th-century eggnog recipe

#### WHAT THE FUTURE HOLDS.....62

Annuity and loan calculations on your Model 100

### REVIEWS

#### A SIX-GUN BY YOUR SIDE.....31

PCSG's Six ROM Bank

#### CASSETTE HELP.....32

Traveling Software's T-Backup

#### MODEL 100 FIX ALL.....34

Tandy's Assembler/Debugger

#### MORE FOR LESS.....36

BKInc.'s DO4MAT

### DEPARTMENTS

#### ROM WITH A VIEW .....5

#### TELCOM.....6

#### NEW PRODUCTS .....14

#### GIGO.....61

#### AD INDEX .....83



*Editor*  
J.D. Hildebrand  
*Managing Editor*  
Edward M. Jackson  
*Senior Editor*  
Park M. Morrison  
*Technical Editor*  
Alan L. Zeichick

*Production Director*  
Peter D. Koons  
*Art Director*  
Paige Garland Parker  
*Assistant Art Director*  
Elizabeth Maritato  
*Staff Artists*  
Kenneth Martin  
Marjorie Strauss  
Judith E.C. Webster

*Advertising Director*  
David Hollis  
*Circulation Director*  
Nancy A. Wight  
*Circulation Manager*  
Loriel Peters  
*Subscriber Relations*  
Melissa R. Andrews  
Mary W. Holmes  
*Business Manager*  
April A. Jenkins  
*MIS Director*  
Bonnie Hellevig

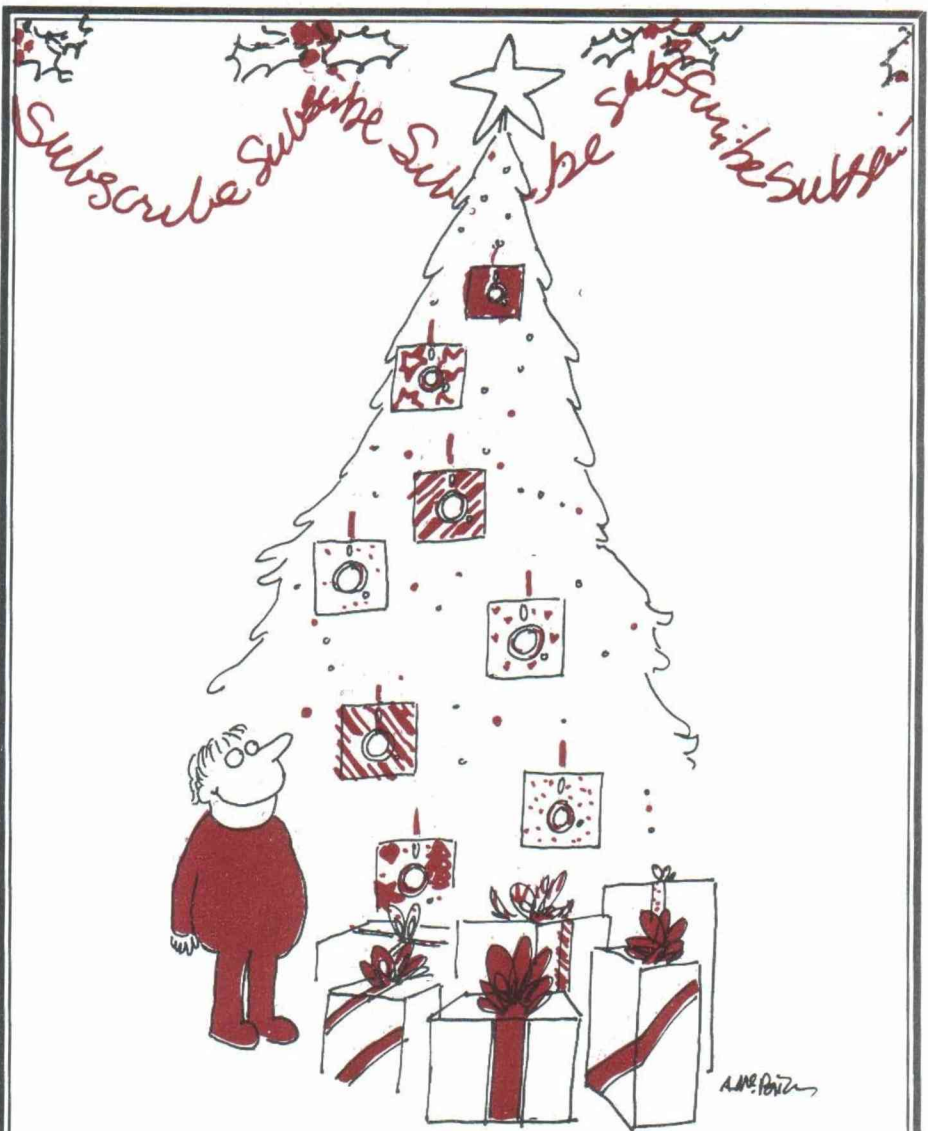
*Publisher*  
James S. Povec  
*Associate Publisher*  
Carl Cramer  
*Editorial and Business Offices:*  
Camden Communications, Inc.  
P.O. Box 250  
Highland Mill  
Camden, ME 04843  
(207) 236-4365  
CompuServe ID: 76703,372  
Fax Tel. (207) 236-4738

PORTABLE 100/200 is published monthly by Camden Communications, Inc.: James S. Povec, president; Carl Cramer, vice president. Application for mailing at second class rates pending at Camden, ME and additional mailing offices. Postmaster: Address changes to Camden Communications, Inc., P.O. Box 250, Highland Mill, Camden, ME 04843. Copyright 1985 by Camden Communications, Inc. All rights reserved. Portable 100/200 is an independent publication of Camden Communications, Inc. and is not affiliated in any way with Tandy Corp./Radio Shack. TRS-80, Model 100, Tandy and Tandy 200 are trademarks of Tandy Corp./Radio Shack.

Contributors: Manuscripts and photographs are welcomed. Publisher assumes no responsibility for the return of unsolicited manuscripts, queries or artwork. Materials submitted for consideration should be accompanied by a self-addressed, stamped envelope.

Subscriptions are \$32 for 12 issues. Users group subscription rates available. Please inquire for delivery rates outside the U.S. Dealer inquiries invited.

ISSN 0738-7016



Here's Your Solution For Christmas Gift Buying! Give *Portable 100* Subscriptions This Year!

It's easy! Make a fellow computerist happy this Christmas with a subscription to *Portable 100* Magazine.

A gift subscription to *Portable 100* will help your friends and family use their Model 100s or Tandy 200s or Tandy 600s to their highest capacity.

Every month, they'll enjoy an issue of *Portable 100*, and they'll think of you all year long — every time they receive an issue! Order today to be in time for Christmas! Use this order form or the order card opposite this page.

Send a gift subscription to:

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY/STATE/ZIP \_\_\_\_\_

MY NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY/STATE/ZIP \_\_\_\_\_

\_\_\_\_ Payment Enclosed      \_\_\_\_\_ MasterCard/Visa # \_\_\_\_\_  
at \$29.97 each                      Exp. Date \_\_\_\_\_

Signature \_\_\_\_\_

\*All gift subscriptions must be pre-paid.

Send to: Portable 100, P.O. Box 250, Camden, ME 04843



# FOR PERFROMANCE YOU WILL WANT TOMORROW...

**DRIVE**  
**\$599.00\***



## PICDISC

## TODAY!

### Power...

- Menu driven load/store capability for transferring individual files or total memory to disk.
- CP/M operating system makes available a world of popular software: dBASE II, Wordstar, Supercalc, and much, much more.
- T/Maker software option (\$200.00) provides: word processing, spreadsheet, data base manager, spelling checker, bar graphics.
- Uses 3½" diskettes (360K).
- 64 K bytes of RAM (with your 32K) (8K chips, \$30).

### Convenience...

- Totally portable, lightweight, attaches easily.
- Battery powered, rechargeable, plenty of advance warning on low batteries.
- Fragile connectors protected by our gold high-reliability connector.
- Display 40 x 8 window in 80 x 24; 60-column available.

### Economy...

- Similar disk drive systems with equivalent software can cost \$1,400 - \$2,000. Compare and see for yourself.

### CALL US ABOUT:

- Solar Panels/Portable Battery Rechargers
- Second Disk Drive (due February, 1986)
- Video Interface (due February, 1986)
- Transferring your data/programs from 5¼" disks to 3½"

\*30-Day Refund Guarantee

Free Traveling Software Special!

**\$230.00 Value!**

Call Today

714-261-0503 call collect  
1-800-421-6300 toll free

**PIC** The Personal Automaton People

CP/M, dBASE II, Wordstar, Supercalc & T/Maker are trademarks of Digital Research, Ashton-Tate, MicroPro, Sorcim, & T/Maker respectively.



# ROM WARS

The hottest thing in the Tandy laptop market is option ROM. Packaging one, two, three or more programs on a single chip is the perfect portable idea. There's no fuss, no muss and no blasted cassette tapes to deal with. Firmware ROMs make the portable computer's immense promise a reality, turning low-power general-purpose micros into sophisticated electronic appliances capable of performing a wide range of advanced tasks.

The last few months have seen a rash of ROMware introductions: Portable Computer Support Group's Write ROM, Traveling Software's Ultimate ROM, Polar Engineering's Cleuseau, Tandy's Interactive Solutions, and on and on.

There are as yet few players in the option ROM market. That's because the obstacles to putting programs on chips are financial, not technological. Thanks to pioneer work by Polar's Tom Bennett, the mechanical and electronic techniques are well understood. But the process of mastering a ROM and manufacturing the first production run is a fiscally daunting one. The high entrance fee in the option ROM derby has limited full-scale participation to a couple of large companies.

## MY ROM'S BETTER THAN YOUR ROM

The two main players are Dallas-based Portable Computer Support Group and Traveling Software of Seattle. PCSG and Traveling Software have commanded a lion's share of the Model 100 third-party software market for almost two years. Although a couple dozen other firms offer very fine products for the 100 and 200, only PCSG and Traveling Software (and Tandy, of course, but that's a different story) have the financial clout to be pioneers in the option ROM wilderness.

Predictably enough, the two companies have become fierce rivals. When one introduces a product, the other quickly announces a knock-off with a lower price or extra features. It's the "anything you can do, I can do better" approach to product marketing.

Because of the intense competition, product development is proceeding at a fast and furious pace. Some products hardly have time to establish themselves before they're outdated.

Six months ago PCSG introduced the Six-ROM Bank. The ad proclaimed that it would let users access Lucid, Write ROM and other firmware applications instantly. It cost \$269 — not counting the price of the software.

Then Traveling Software introduced the Ultimate ROM. You get virtually the same capability for \$239.95.

PCSG responded with Super ROM, an Ultimate ROM clone that includes its best-selling spreadsheet manager, Lucid. If you read the Super ROM ad closely, you'll notice some small italic print in the lower right corner: *Got stuck with somebody else's multi-ROM? We'll upgrade it for \$100.* There's really no question about whose multi-ROM they mean.

It didn't take Traveling Software long to retaliate. Ultimate ROM II, introduced in the New Products department of this issue, is bigger, better and faster than its predecessor.

Like PCSG, Traveling Software offers a \$100 rebate to owners of selected ROMs. And we all know who tops the "selected" list.

It's easy to get caught up in the spectacle, watching these two companies spend vital resources clobbering each other instead of concentrating on business. It's quite a show.

But the competition isn't just entertaining; it's productive. It's paying off in immediate benefits to all of us who use Tandy laptops.

In their constant attempts to outdo each other, PCSG and Traveling Software are outdoing themselves, stretching their research and development dollars to the maximum and introducing products that dazzle. The competition is even helping to drive costs down. So we're all better off.

The danger, of course, is that one company might gain the upper hand, might drive the other out of the laptop market and into a safer occupation like crocodile wrestling or exhibition skydiving. If one loses, we all lose.


## YOU CAN CALL ME RAY. . .

As you may have noticed on the cover of this issue, we've made a name change. Thanks to the new Tandy 600 we will, at least for the time being, call ourselves *Portable 100/200/600*. We know it's a mouthful but it's the only name that truly represents what we're all about. Don't worry though. We still respond to *Portable 100*, *Portable 100/200* and the occasional, "Hey you."

Speaking of the 600, it's the subject of our cover story this month. This is the second issue in a row that's featured a Tandy product on the cover. Are we showing favoritism? Not at all. It's just that Tandy has introduced two significant products at essentially the same time. They were ready to be reviewed and we did just that.

Also included this month are some programs that we think are just downright fun. A hearing test, an egg nog recipe, bearing and distance calculations, and more. In addition, we've reviewed a number of leading products — including PCSG's Six ROM Bank, which lets you use Write ROM, Lucid, Ultimate ROM, Super ROM and Ultimate ROM II all at once in the same machine if you've a mind to.

All together, they make this the largest issue in our history. Appropriately enough, it comes at that time of year when giving is better than receiving. Merry Christmas.



PARK M. MORRISON  
SENIOR EDITOR



# RUBBING THE LAMP. . . .

**A**re connect-time and long-distance telephone charges eating away at your budget? Or is the fear of big bills keeping you from exploring the world of telecommunications? If so, then GENie is for you. GENie, sponsored by General Electric, is less expensive than most — and offers a wide variety of services for both the novice and veteran telecommunicator.

## DIALING UP

GENie's services are available 24 hours per day, every day. Most dial-up phone lines accept both 300 and 1200 bits per second (bps) — and the connect-time charge is the same for all transmission speeds.

A one-time subscription fee of \$18.00 is charged to open a GENie account and purchase a GENie User's Manual. New subscribers through December 31, 1985 will receive three non-prime-time connect hours at no additional charge.

The basic connect time rate is \$35 per hour. The non-prime time rate is a mere \$5 per hour — one of the best bargains in the business.

Non-prime time is between 6 p.m. and 8 a.m. local time weekdays, all day weekends, and on all U.S. national holidays. Prime time is between 8 a.m. and 6 p.m. local time weekdays. Local time zones are assigned by state, with Alaska and Hawaii being assigned to Pacific time.

A few low-density access cities have a telecommunications surcharge of \$2.00 per hour (prime or non-prime time).

All billing for GENie services is done through Visa, Mastercard, or direct debiting from your checking account.

To join GENie, call your local access number — and there are hundreds across the country. After connection, type the letter *H* repeatedly until the *U#*= prompt appears. Then, enter **5JM11999,GENIE** — and this is case-sensitive, so be careful. Using this demonstration account number, you can peruse GENie's features free of charge. If you like what you see, the sign-up process is just another menu option.

Telcom settings for the Model 100 should be either M7E1E or M8N1E, half duplex. If you have any difficulty, call

GENie Customer Assistance at (800) 638-9636, extension 21.

## WHAT TO SEE

One place to visit while on GENie is the Laptop RoundTable, a new special-interest group sponsored by the staff of Portable 100. We'll be there!

Check our GE Mail and the National Real-Time Conference — complete with interesting special guest speakers.

### Alabama

|            |              |   |
|------------|--------------|---|
| Anniston   | 205-237-4224 | S |
| Birmingham | 205-323-7900 |   |
| Dothan     | 205-793-6390 | S |
| Hartselle  | 205-773-6551 | S |
| Mobile     | 205-432-0571 |   |
| Scottsboro | 205-259-1855 | S |
| Tuscaloosa | 205-758-8356 | S |

### Alaska

|           |              |  |
|-----------|--------------|--|
| Anchorage | 907-276-0911 |  |
|-----------|--------------|--|

### Arizona

|         |              |   |
|---------|--------------|---|
| Benson  | 602-586-3681 | S |
| Phoenix | 602-266-0260 |   |
| Tucson  | 602-622-2758 |   |

### Arkansas

|             |              |   |
|-------------|--------------|---|
| Conway      | 501-327-2237 | S |
| Crossett    | 501-567-8000 | S |
| Ft. Smith   | 501-782-0391 | S |
| Jonesboro   | 501-935-8007 |   |
| Little Rock | 501-372-6389 |   |

### California

|                 |              |   |
|-----------------|--------------|---|
| Antioch         | 415-778-0123 | S |
| Bakersfield     | 805-833-6260 |   |
| Canoga Park     | 818-884-2127 |   |
| Chico           | 916-342-0262 | S |
| Concord         | 415-825-9111 |   |
| Dublin          | 415-829-8840 |   |
| El Monte        | 818-579-6440 |   |
| Eureka          | 707-445-5461 | S |
| Fresno          | 209-264-4655 |   |
| Garden Grove    | 714-636-5102 |   |
| Garden Grove    | 714-636-5330 |   |
| Livermore       | 415-443-6543 | S |
| Lompoc          | 805-735-5440 | S |
| Long Beach      | 213-513-6893 |   |
| Los Angeles     | 213-776-7222 |   |
| Los Angeles     | 213-776-2710 |   |
| Marysville      | 916-742-5139 | S |
| Merced          | 209-384-2271 | S |
| Modesto         | 209-529-8055 |   |
| Monterey        | 408-372-8579 | S |
| Oakland         | 415-836-5060 |   |
| Oakland         | 415-836-6800 |   |
| Oceanside       | 619-439-9980 |   |
| Ontario         | 714-983-9841 | S |
| Oxnard          | 805-487-9871 |   |
| Palm Springs    | 619-323-2763 | S |
| Redwood City    | 415-364-0900 |   |
| Rialto          | 714-875-8751 |   |
| Roseville       | 916-726-5697 | S |
| S.J. Capistrano | 714-661-2804 | S |
| Sacramento      | 916-441-6126 |   |
| Salinas         | 408-455-1020 | S |
| San Bruno       | 415-871-1522 |   |
| San Diego       | 619-296-5083 |   |

The LiveWire CB Simulator provides real-time conferencing with people all over the country. There are 40 channels. For business or private conversations, CB'ers can scramble their conversations — making them unintelligible except to those with the right scrambler key.

New features are being added to GENie daily. The price is right, the demonstration is free, the modem's built in. So, come on and join the adventure.

|                  |              |   |
|------------------|--------------|---|
| San Luis Obispo  | 805-541-3215 | S |
| San Martin       | 408-683-4195 | S |
| San Rafael       | 415-454-5300 |   |
| Santa Barbara    | 805-963-6811 |   |
| Santa Cruz       | 408-425-1283 | S |
| Santa Rosa       | 707-545-8600 | S |
| Stockton         | 209-948-1429 | S |
| Sunnyvale        | 408-737-8450 |   |
| Sunnyvale        | 408-738-3635 |   |
| Sunnyvale        | 408-746-0651 |   |
| Ukiah            | 707-462-0384 | S |
| Union City       | 415-489-9400 | S |
| W. San Francisco | 415-433-4211 | S |

### Colorado

|                  |              |   |
|------------------|--------------|---|
| Colorado Springs | 303-633-5545 |   |
| Denver           | 303-239-0771 |   |
| Loveland         | 303-669-9281 | S |
| Montrose         | 303-249-0582 | S |

### Connecticut

|              |              |   |
|--------------|--------------|---|
| Bridgeport   | 203-373-2905 |   |
| Bridgeport   | 203-373-3047 |   |
| Bristol      | 203-584-8364 | S |
| Danbury      | 203-748-5850 | S |
| Groton       | 203-445-7466 |   |
| Hartford     | 203-527-5554 |   |
| Hartford     | 203-727-8400 |   |
| New Haven    | 203-865-7971 |   |
| Norwalk      | 203-853-6733 |   |
| Old Saybrook | 203-388-4481 | S |
| Stamford     | 203-348-2448 |   |
| Stamford     | 203-964-1714 |   |
| Waterbury    | 203-573-9003 |   |

### Delaware

|            |              |  |
|------------|--------------|--|
| Wilmington | 302-652-3074 |  |
|------------|--------------|--|

### Florida

|                  |              |   |
|------------------|--------------|---|
| Clearwater       | 813-447-9521 |   |
| Daytona Beach    | 904-258-5484 |   |
| Ft. Lauderdale   | 305-791-6202 |   |
| Ft. Pierce       | 305-464-4300 | S |
| Ft. Walton Beach | 904-243-8078 | S |
| Gainesville      | 904-462-6824 |   |
| Jacksonville     | 904-396-7210 |   |
| Kissimmee        | 305-847-0269 |   |
| Lakeland         | 813-688-6020 |   |
| Melbourne        | 305-724-4660 |   |
| Miami            | 305-633-9772 |   |
| Miami            | 305-635-6431 |   |
| New Smyrna Beach | 904-427-8427 | S |
| Orlando          | 305-422-2823 |   |
| Palatka          | 904-328-7703 | S |
| Pensacola        | 904-434-3656 | S |
| Sarasota         | 813-957-0472 |   |
| Stuart           | 305-286-1119 | S |
| Tallahassee      | 904-222-0859 |   |

(Listing continues on page 82)

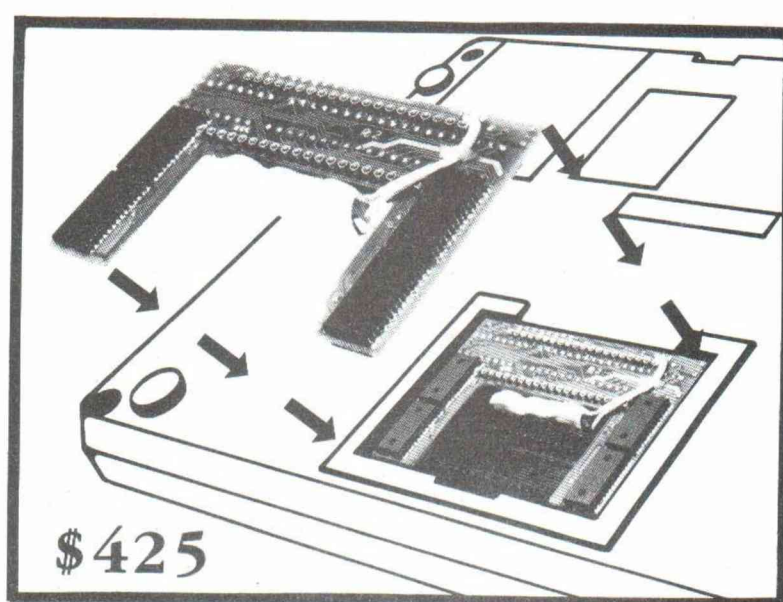


Give your Model 100

# 128K

# RAM

Installs as easily  
as plugging  
in a socket



Software included, transfers from bank to bank. Works like main menu! Includes powerful RAM Basic that lets any program regard the 128K as one continuous bank.

## PCSG says: Satisfaction guaranteed or your money back within 30 days

As amazing as it seems you can upgrade your Model 100 to 128K of RAM in just 60 seconds.

It comes to you right out of the box looking just like the picture. You just open the little compartment on the back of your Model 100 with a quarter and it just pushes right into place. You can then put the cover back in its place.

You then have 4 banks of RAM of 32K each. The additional three banks also work just like your Main Menu.

You push a function key and you are in the second bank. Push again and you are in third, again, then fourth. Press it once again for your original bank.

It has its own built-in NiCad battery that recharges right from the Model 100 and its guaranteed for a full year.

What is really great is that you can copy a file from one bank to another with just a function key.

Each bank is like having another Model 100, and all the built-in programs as well as any snap-in ROM programs appear in all four banks and work the same way. Your widebar cursor moves from file to file and you access any file or run any program just by pressing ENTER.

What lets you copy any file from one bank to another is a snap-in ROM from PCSG called RAM+, that comes at no extra charge. It just pushes right into the little socket in that same compartment with the 96K expansion unit.

Not only does this firmware let you copy a file from bank to bank, but you can make a copy of any file within the same bank instantly with a function key. Great for Lucid spreadsheets!

### Copy a file from bank to bank with a function key

You can also rename a file, or kill any file with just a function key. Plus you can do a whole lot of other useful things like setting the date, day and time with function key ease. You even have a function key that lets you use non-Radio Shack printers without having to make those tricky dipswitch settings.

RAM+ lets you cold start any one of your banks without affecting the other three. That means that anytime you want you can clean out a bank's entire memory, but leave intact all the files in the other banks.

What is also fantastic is that you don't have to have the ROM in place to use the additional RAM. Whenever you take out the snap-in ROM it leaves behind a tiny machine code program that lets you switch from bank to bank just by pressing ENTER.

This lets you use your ROM socket to snap-in other ROMs like LUCID spreadsheet, WRITE ROM text processor, or DISK+ ROM file transfer program, and use them in any or all four banks. All of these, by the way, are available from PCSG.

When you are ready to copy a file from one bank to another or use any of the other fantastic functions we talked about you can just snap the RAM+ ROM back into place.

Everybody that has this 128K system in their Model 100 is so excited, because it gives them four times the capacity and all banks work just like the Main Menu.

And what has made a lot of people happy is that the system bus, located in the same compartment, is left free for you to plug in a DVI or the Holmes Engineering/PCSG portable disk drive.

The ability to copy a file from bank to bank instantly with a function key, plus all of the other features make this RAM extension truly an engineering masterpiece.

Some people hesitate when they think of installing something, and then others are skeptical that any additional hardware could be as good as the Model 100 itself. That's why we sell these 96K expansions on a 30 day trial. Simply return it within 30 days for a full refund if you are not satisfied. Priced at \$425. MC VISA COD.

**1 (214) 351-0564**

PORTABLE COMPUTER SUPPORT GROUP

11035 Harry Hines Blvd. No. 207, Dallas, Tx. 75229

VISA / MASTER CARD / C.O.D.

Circle 33 on Reader Service Card



NEW! MODEL 100 3-in-1 ROM

# Interactive Solutions<sup>\*</sup>

All the software that you will ever need  
on the Model 100 Portable:

A Truly  
Integrated  
Software

- 1— Data Base
- 2— Spreadsheet
- 3— Word Processor  
with Mail Merge

Now on a plug-in ROM. *Integrated* and easy as 1-2-3!

## Interactive Solutions

Tandy Cat. #26-3844

Available at your nearest

**Radio Shack<sup>®</sup>**  
COMPUTER CENTERS

■ **The Data Base** turns your Mod 100 into a personal filing system. You can store, examine, update select, sort and list a wide variety of information - from personnel records and inventory facts to appointment schedules and client lists.

■ **The Spreadsheet** turns your Mod 100 into a powerful decision tool. It is a full featured spreadsheet with 99x99 cells and provides fast decimal arithmetic in formula computation with complete range of scientific functions.

■ **The Word Processor** uses the Text editor of Mod 100 and gives you additional features for formatting and printing. You can set margins, line/para spacing, justify, define header/footer and use special print features like underline, **boldface**, etc.

**MORE MEMORY** Interactive Solutions does not occupy RAM memory, so frees your precious RAM for larger data files.

**EXTRA CONVENIENCE** Interactive Solutions plugs in the optional ROM socket. It is always resident and ready to work. You don't need to load programs from cassette recorder any more.

**Interactive Solutions integrates** all of your data information in Mod 100. With a touch of a function key, you can easily:

- Select and move items from **Data Base** files into **Spreadsheet** columns.
- Generate a report in **Data Base** program and move to the **Word Processor**.
- Cut any part of **Spreadsheet** and move to the **Word Processor**.
- Merge the items (like names, addresses) from **Data Base** files into a **Form Letter** and generate multiple letters or labels.

*All this and much more in  
a 32K bytes ROM from*

DCM Data Products  
1710, Two Tandy Center  
Fort Worth, Tx. 76102  
Tel: 817/390-2762



\*Copyright DCM Data Products, Licensed to Tandy Corporation.

\* Registered trademark of Tandy Corporation.

Radio Shack and Model 100 are trademarks of Tandy Corporation.  
1-2-3 is a trademark of Lotus Corporation.





# High-Tech Hearing Test

By Janet Goldenberg



f you've ever experimented with the Model 100's sound generator, you've probably learned how to play simple tunes, using the SOUND command and the table of pitch values on page 180 in the user's manual. Programming music this way is tedious and awkward; but as Samuel Johnson said about dogs walking on their hind legs, you're surprised it can be done at all.

What you may find even more surprising, however, is that the Model 100 is not limited to the pitches in the table. The table list ranges from pitches 12535 to 415, but a cryptic phrase above it indicates the full range is actually 16383 to 0. (Despite what the manual says, *lower* numbers sound *higher* pitches, not vice versa.) By trying the following two-line program, you can demonstrate for yourself that the Model 100 will produce notes somewhat lower, and far higher, than the ones in the table. In fact far higher than you can hear.

```
10 FOR P=16383 TO 0 STEP -50
```

```
20 SOUND P,2:NEXT P
```

Notice how the pitches climb and then vanish entirely, except for the soft on-off click of the tone generator. If you start this *glissando* higher in its range and ascend it more gradually, this auditory vanishing point is more pronounced:

```
10 FOR I=1000 TO 0 STEP -25
```

```
20 SOUND I,16:NEXT I
```

## SOUNDING OFF

In trials on human subjects I've determined this pitch threshold varies with the hearer. For me it's around pitch 200; for you it may be slightly lower or higher. What this implies is that at least some of Model 100's "silent" high notes are actually ultrasonic tones. These are the frequencies, above human hearing, which your dog responds to when you blow a dog whistle and which bats use to navigate in the dark.



Model 100/200 - NEC PC 8201A

Olivetti M10

Your One  
Stop For



## Portable Software

**AutoPack SPECIAL** (Model 100 & NEC only) \$89.50 - About all you need on one tape. Includes: **AutoPen**, **AutoPad**, **AutoBase**, **AutoSort**, **TFILE**, **TRIP**, **CALC** and **AutoPen N&A**. Over 50% off separate prices.

**AutoPen** (2.5K) \$29.95 - Word processing using standard formats. 22 text commands for format control. Print from RAM, tape and keyboard; chain files; multiple copies; continuous or cut paper; and more features. Customize for your printer. Best available for size and price.

**AutoPen, N&A** (3.7K) \$39.50 - Merges names, addresses and salutations into letters, prints labels and addresses envelopes. N&A data management system. Includes AutoPen.

**AutoPad** (5.4K) \$39.50 - 26 by 99 spreadsheet. Variable column width and format. Math, statistical and financial functions. Sort, replicate, calculator and other features. Printer output with titles and footnotes.

**AutoBase** (2K) \$29.50 - Database management for limited RAM. Design input forms using up to 16 fields. Use up to 9 keyword or relational field criteria to select records for display or printing. Print forms or specific fields in a list or label format.

**AutoSort** (.4K) \$14.50 - Sort single or multiple (AutoBase, N&A, INDEX, etc.) field records.

**BOOK** (3.8K) \$29.50 - Single entry book-keeping for self employed or small businesses using SCHEDULE C tax accounts. Summary review and detailed printer output.

**TFILE** (1.4K) \$29.50 - Tape file utility to review, compute size, delete, and auto save or load files. Tape directory with printer output.

**TRIP** (2K) \$29.50 - Itinerary, expense account and trip report. Review and printer output.

**CHECK** (2K) \$29.50 - Maintains account balance and records. Review and printer output.

**INDEX** (3.4K) \$29.50 - Sorts and prints multi column lists. Indexes page references.

**CALC** (.6K) \$14.50 - Allows you to use your computer like a simple pocket calculator.

Add \$3.00 for mailing and handling  
Send for FREE catalog

**CSA Software, Box 22261**  
**Chattanooga, TN 37422**  
**24 Hr. toll free order desk**  
**800-628-2828 Ext. 508**



INFORMATION  
615-892-2339



## HEARING TEST

Table 1

### HEARING & SOUND EMISSION OF SUNDRY ANIMALS & DEVICES IN HERTZ (CYCLES PER SECOND)

#### HEARING:

|           |                |
|-----------|----------------|
| Crocodile | 20 - 6,000     |
| Human     | 20 - 20,000    |
| Dog       | 15 - 50,000    |
| Cat       | 60 - 65,000    |
| Bat       | 1000 - 120,000 |
| Moth      | 3000 - 150,000 |
| Porpoise  | 150 - 150,000  |

#### SOUND EMISSION:

|             |                  |
|-------------|------------------|
| Dog         | 452 - 1080       |
| Human       | 85 - 1100        |
| Cat         | 760 - 1520       |
| Horse       | 320 - 3040       |
| Piano       | 30 - 4100        |
| Dog Whistle | 12,000 - 14,000  |
| Sonar       | 10,000 - 50,000  |
| Bat         | 10,000 - 120,000 |

\*Model 100 150 - 190,000+

Sources: Life Science Library: Sound & Hearing, Time, Inc., 1965  
and The New Columbia Encyclopedia, Columbia University Press, 1975.

Why was this talent built into the Model 100? Not only couldn't Tandy explain it when asked recently, but they didn't even know about it. "Ultrasound? You've got to be kidding," responded product manager Stuart Weinstock through a spokesperson. "That's the first we've heard of it. We certainly didn't design it that way." Nonetheless, though I didn't confirm this with an oscilloscope, logic suggests it exists.

To calculate just how high these ultra-frequencies might be, I first calibrated one of the Model 100's lower, audible octaves with its equivalent on the piano, whose pitch frequencies are well known. Then, invoking a basic principle of acoustics, I doubled these numbers to obtain the frequencies for each higher octave. Adult humans normally hear between 20 and 20,000 vibrations per

second (also called "cycles per second" or "hertz"). Children can hear as high as 40,000 vps, dogs up to 50,000 vps. The Model 100, by my calculations, can theoretically produce pitches higher than 190,000 vps, which would put it in a league with bats, porpoises and the U.S. Navy. Whether the Model 100's speaker can actually handle frequencies that high is another question. (Top-of-the-line stereo tweeters rarely exceed 25,000 vps.) But at the lower end of the scale, at least, I've proved to my satisfaction that sound indeed comes out — even if we can't hear it.

#### DO YOU HEAR WHAT I HEAR?

To make use of this peculiar feature, I wrote a program that turns the Model 100 into a crude version of the audiometer they used to test your hearing in

Table 2.0: Pitch Values

### OCTAVE

| NOTE | 1     | 2    | 3    | 4    | 5   | 6   | 7   | 8  | 9  | 10 |
|------|-------|------|------|------|-----|-----|-----|----|----|----|
| G    | 12538 | 6269 | 3134 | 1567 | 784 | 392 | 196 | 98 | 49 | 24 |
| G#   | 11836 | 5918 | 2959 | 1479 | 739 | 370 | 185 | 92 | 46 | 23 |
| A    | 11172 | 5586 | 2793 | 1396 | 698 | 349 | 175 | 87 | 44 | 22 |
| A#   | 10544 | 5272 | 2636 | 1318 | 659 | 329 | 165 | 82 | 41 | 21 |
| B    | 9952  | 4976 | 2488 | 1244 | 622 | 311 | 155 | 78 | 39 | 19 |
| C    | 9394  | 4697 | 2348 | 1174 | 587 | 294 | 147 | 73 | 37 | 18 |
| C#   | 8866  | 4433 | 2216 | 1108 | 554 | 277 | 139 | 69 | 35 | 17 |
| D    | 8368  | 4184 | 2092 | 1046 | 523 | 261 | 131 | 65 | 33 | 16 |
| D#   | 7900  | 3950 | 1975 | 987  | 494 | 247 | 123 | 62 | 31 | 15 |
| E    | 7456  | 3728 | 1864 | 932  | 466 | 233 | 116 | 58 | 29 | 15 |
| F    | 7032  | 3516 | 1758 | 879  | 439 | 220 | 110 | 55 | 27 | 14 |
| F#   | 6642  | 3321 | 1660 | 830  | 415 | 208 | 104 | 52 | 26 | 13 |



# HEARING TEST

Table 2.1: Frequencies

## OCTAVE

| NOTE | 1   | 2   | 3    | 4    | 5    | 6     | 7     | 8     | 9     | 10     |
|------|-----|-----|------|------|------|-------|-------|-------|-------|--------|
| G    | 196 | 392 | 784  | 1586 | 3136 | 6272  | 12544 | 25088 | 50176 | 100352 |
| G#   | 207 | 415 | 830  | 1660 | 3320 | 6640  | 13280 | 26560 | 53120 | 106240 |
| A    | 220 | 440 | 880  | 1760 | 3520 | 7040  | 14080 | 28160 | 56320 | 112640 |
| A#   | 233 | 466 | 932  | 1864 | 3728 | 7456  | 14912 | 29824 | 59648 | 119296 |
| B    | 247 | 494 | 988  | 1976 | 3952 | 7904  | 15808 | 31616 | 63232 | 126464 |
| C    | 264 | 528 | 1056 | 2112 | 4224 | 8448  | 16896 | 33792 | 67584 | 135168 |
| C#   | 277 | 554 | 1108 | 2216 | 4432 | 8864  | 17728 | 35456 | 70912 | 141824 |
| D    | 294 | 588 | 1176 | 2352 | 4704 | 9408  | 18816 | 37632 | 75264 | 150528 |
| D#   | 311 | 622 | 1244 | 2488 | 4976 | 9952  | 19904 | 39808 | 79616 | 159232 |
| E    | 330 | 660 | 1320 | 2640 | 5280 | 10560 | 21120 | 42240 | 84480 | 168960 |
| F    | 349 | 698 | 1396 | 2792 | 5584 | 11168 | 22336 | 44672 | 89344 | 178688 |
| F#   | 370 | 740 | 1480 | 2960 | 5920 | 11840 | 23680 | 47360 | 94720 | 189440 |

grade school. As you may recall, that device had earphones through which you listened for tones in either ear. When you heard one, you raised a hand. One essential difference in my program is that while audiometers usually test in the 100-10,000 vps range, the Model 100 can test you only at the high end of the range since its absolute lowest pitch (16383) is around 150 vps.

Another difference is that your ability to hear a given pitch depends on how loudly it's played. Since the Model 100's volume can't be increased, it's unlikely you can hear all the way to 20,000 vps. Finally, since the Model 100 lacks stereo channels and earphones, you can't test each ear individually, nor can you exclude outside noise. Within these limits, however, you can have fun hearing how you stack up against friends and pets.

I tried this recently in a friend's living room in the Sierra foothills, where six of us had gathered with sundry dogs and cats. Interestingly, while most of the humans heard an average maximum of around 12,000 vps, the women heard

higher frequencies than the men. One woman, a horse trainer who claimed that as a child she could hear bats squeaking, topped us all by hearing over 16,000 vps.

Though we couldn't measure their responses exactly, the animals' body language seemed to indicate they were registering some "silent" high sounds we were missing. One of the dogs dropped to the rug and rolled his eyes as if pleading with us to stop, and all the cats left the room, though that wasn't too unusual.

Eager to test the Model 100 to its limits, I went outside to try it on Echo, my friends' Appaloosa mare. At the first ultrasonic squeak, Echo perked up her ears and moved closer to the fence — but I can't be sure of the cause. It may have been the Model 100, or it may — just possibly — have been the carrot in my other hand. □

*Please help us rate this article's value. If you've found it very valuable, circle 161 on the Reader Service Card. If it was moderately valuable, circle 162—and if it wasn't valuable to you, circle 163.*

### Listing 1: Hearing Test

*This program uses the Model 100's ultrasonic range to test your hearing. After playing each note, starting at SOUND 50 or about 49,140 hertz, the computer asks if you have heard it. If you answer no, it proceeds to the next lower pitch value at an interval of 20, then asks you again. When you finally answer yes, the program tells you the highest pitch you heard, in hertz. Note that children and women can generally hear higher tones than can older adults and men.*

```

30 ' *           HEARING TEST           *
40 ' *           (HRTST.BA)             *
50 ' *           By Janet Goldenberg     *
100 CLS
:FOR S=10000 TO 0 STEP -50
:SOUND S,2
:NEXT S

```

# The Portable Accountant

Accounting System

for the Model 100/200

- Allows More Time for Professional Services
- Improve Report Turnaround
- Speed Client Writeups
- Reduce Errors

The PORTABLE ACCOUNTANT provides a fully integrated accounting system for any small business featuring:

Cash Disbursements Journals  
Cash Receipts Journals  
General Journals  
Detailed General Ledger  
Trial Balance  
Automated Backup  
Automated Balance Forward

Mail to:  
**The Portable Accountant**  
FACS, Inc.

Box 2132, White Flint Mall,  
Kensington, Maryland 20895  
301-933-7092

☐ Enclosed is my check for \$99.95.

My Model 100 is a:

☐ 8K ☐ 24K ☐ 32K

Signature \_\_\_\_\_



Ship to:

Name \_\_\_\_\_

Street \_\_\_\_\_

City/State/Zip \_\_\_\_\_

☐ Please charge \$99.95 to my

☐  ☐ 

Account # \_\_\_\_\_

Exp. Date \_\_\_\_\_

Circle 22 on Reader Service Card



Direct from the North Pole Now Through January 15

Model 100 Nec 8201A Tandy 200

**SAVE OVER 30%**

# Christmas Sale

**Cleuseau** was \$95 **NOW \$65**

Text Editor and BASIC Inspector. Amazing Edit functions. Overwrite. Search and Replace. Append to the Paste Buffer. Search Backwards. Repeat any function a specified number of times. Inspect your BASIC code. Renumber. Remove every unnecessary byte from your program with one command. Stop points and Print points to follow program execution. Show the GOSUB/RETURN Stack. Kill lines. Copy or Move lines, renumbering GOTOs, GOSUBs, etc. List lines with specific characteristics. A MUST FOR PROGRAMMERS.

**ROM2** was \$85 **NOW \$55**

FAST Macro Assembler (300 lines per minute) and Symbolic Debugger (simulates 1000 instructions per second). Assembler allows User-Defined Macros. Conditional Assembly. Expression evaluation. Complete 8085 instruction translation. Complete error checking. Debugger allows memory inspection by name (label). Interactively execute and patch machine code. Single step, step into, out of and over subroutines. Set breakpoints and simulate up to them. Hex and ASCII memory dumps. The choice of most professional software developers.

**Cleuseau + ROM2**

was \$145 **NOW \$95**

Two amazing product together in one ROM. Save \$25 when you buy both. A complete software development system.

**Guardian**

call for prices

Put YOUR BASIC programs in a ROM. Completely customize your computer. Guardian is a service we provide. It seems too simple to be true. You send us up to 30K of .BA, .CO and .DO files on cassette or DVI disk and we will return to you any number of ROMs containing your software. No special programming. No restrictions. Your programs are completely secure; they cannot be listed, copied or altered in any way.

**MasterCard and VISA - call to order**

**(907) 776-5529**

Please add \$4  
shipping and  
handling

**! ROM Software at Cassette Prices !**

Plug in a ROM ten times faster than you can read a tape.

**Polar Engineering and Consulting**

**P.O. Box 7188, Nikiski, Alaska 99635**



# HEARING TEST

```

200 PRINT "This is a text of your high-frequency
    hearing..."
:FOR X=1 TO 500
:NEXT X

300 CLS
:PRINT"Listen to the interval between"

400 PRINT"the two clicks. If you hear nothing,"
500 PRINT"type 'N <ENTER>', and the computer"
600 PRINT"will test you with the next lower tone."
700 PRINT"if you hear something, type 'Y <ENTER>', "
800 PRINT"and the computer will report what"
900 PRINT"frequency you heard."

1000 FOR X=1 TO 500
:NEXT X

1100 INPUT"      READY (press <ENTER>);"RS
:FOR X=1 TO 500
:NEXT X

1200 CLS
:PRINT"LISTEN..."
:FOR X=1 TO 500
:NEXT X

1300 FOR N=50 TO 350 STEP 20
:SOUND N,50
1400 INPUT"Did you hear that tone (Y/N)";AS
1500 IF (AS="Y") OR (AS="y") THEN 1600 ELSE NEXT N
1600 CLS
:PRINT"The highest pitch adults can normally"
:PRINT"hear is 20,000 vibrations per second
    (Hz)."
```

```

1700 PRINT"In this test you heard approximately"
    INT(110/N*22336) "Hz."
1800 FOR X=1 TO 500
:NEXT X
:PRINT""
1900 INPUT"Do you want to try again (Y/N)";BS
2000 IF (BS="Y") OR (BS="y") THEN 1200 ELSE END
```

## Listing 2: Pet Reveille

*Next time your dog or cat drops off to sleep, try this ultrasonic alarm and see what happens. Note that in the higher audible octaves, the melody may not sound right to you. That's because people normally have trouble distinguishing pitches at the high end of the hearing spectrum.*

```

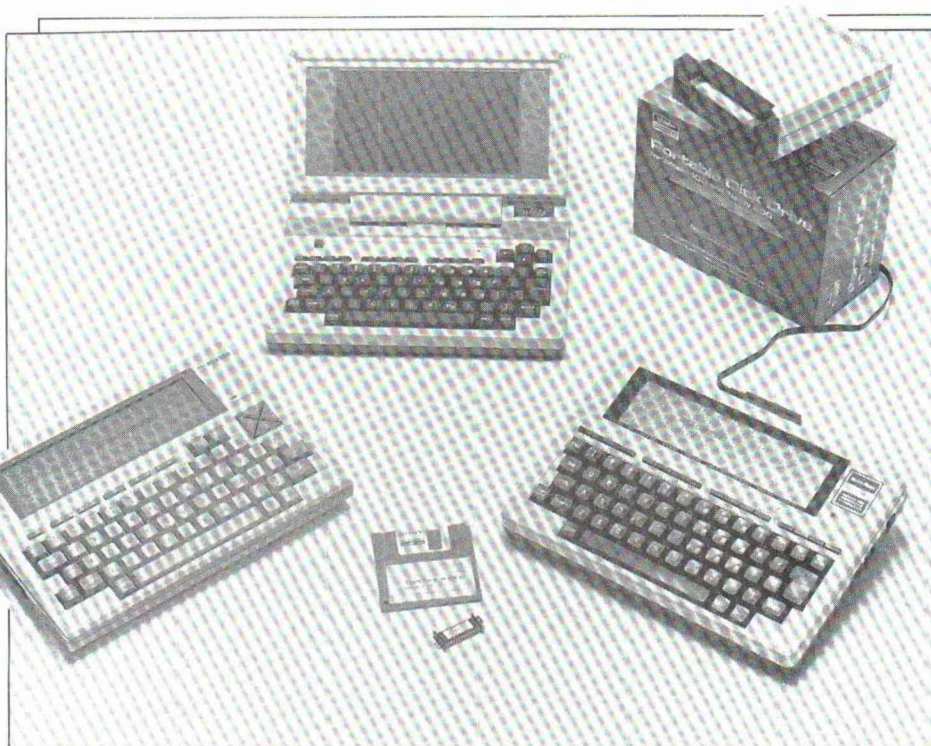
20 CLS
:PRINT "      Pet Reveille"
30 'Transcribed by J. Goldenberg
40 PRINT "You can play this tune in any of 9
    octaves, each octave higher than the other"
50 PRINT "1-5 = Humans      6 = You and Dog
    7-8 = Dogs, Cats  9 = Bats, NATO"
70 INPUT"Octave (1-9)";R
80 IF R=1 THEN X=1
90 IF R=2 THEN X=2
100 IF R=3 THEN X=4
110 IF R=4 THEN X=8
160 IF R=5 THEN X=16
170 IF R=6 THEN X=32
180 IF R=7 THEN X=64
190 IF R=8 THEN X=128
200 IF R=9 THEN X=256
210 G=12538/X
220 C=9394/X
230 E=7456/X
240 GP=6269/X
260 GOSUB 5000
270 SOUND C,8
:SOUND E,16
:SOUND C,8
280 GOSUB 5000
290 SOUND G,8
:SOUND C,24
2000 FOR J=1 TO 5
:SOUND E,8
:NEXT J
2100 SOUND GP,16
:SOUND E,8
:SOUND C,8
```

```

2200 SOUND E,8
:SOUND C,8
:SOUND E,8
:SOUND C,8
:SOUND E,16
:SOUND C,8
2300 FOR J=1 TO 5
:SOUND E,8
:NEXT J
2400 SOUND GP,16
:SOUND E,8
:SOUND C,8
2500 SOUND G,8
:SOUND G,4
:SOUND G,4
:SOUND G,8
:SOUND G,8
:SOUND C,24
2600 PRINT""
:INPUT"ENCORE (Y/N)";ES
2700 IF (ES="Y") OR (ES="y") THEN 20 ELSE END
5000 SOUND G,8
5100 FOR I=1 TO 2
5200 SOUND C,8
:SOUND E,4
:SOUND C,4
:SOUND G,8
:SOUND E,8
5300 NEXT I
5400 SOUND C,8
:SOUND E,4
:SOUND C,4
:SOUND G,8
5500 RETURN
```



# THE MIGHTY GET MIGHTIER



**T**raveling Software, the Seattle-based software company for portable computers, has announced its second generation program ROM: The Ultimate ROM II.

The Ultimate ROM II, available for the Model 100, Tandy 200 and NEC PC-8201, is a major upgrade of the company's Ultimate ROM, introduced in the August issue of Portable 100/200. The new firmware contains a new word processor and 80-column display program, as well as enhanced versions of Idea and T-base.

The Ultimate ROM II's new word processing package is T-Word. According to Mark Eppley, president of Traveling Software, "T-Word has many additional text editing and formatting functions such as overwrite mode, page plotting and search and replace. And, with ROM-VIEW 80, you now have full 80-column text editing capability."

ROM-VIEW 80 enables BASIC, TEXT and TELCOM to function in an 80-column display mode. The firmware generates a smaller 60-column character set for the Model 100 or NEC PC-

8201; lines longer than 60 columns are automatically scrolled during editing. All editing functions of the computer's built-in TEXT program are available under ROM-VIEW 80. This program is not currently available in the Tandy 200 versions of the Ultimate ROM II.

Two of Traveling Software's programs included in the original Ultimate ROM, Idea and T-base, have undergone substantial modification, according to Eppley. T-base, a relational database program, now includes advanced math calculation and is five times faster. Idea, an outline processor, is also five times faster.

A new feature of Idea is optional ThinkTank file compatibility. Files created by ThinkTank, an MS-DOS outline processor by Living Videotext, can be converted to and from Idea format. ThinkTank files are compressed five times during the conversion process, so as to fit into the laptop computer's limited random-access memory (RAM). According to Eppley, "It's possible to take a 100K ThinkTank file from your IBM PC and use it in a Model 100 as a 20K Idea

file."

Another feature of the new firmware is a gateway for future support of the new Tandy portable 3.5-inch disk drive. "We don't want to pre-announce any new products," said Eppley, "but we thought it was important to our customers to know that we have built the foundation for disk drive support into the Ultimate ROM II."

The Ultimate ROM II is available for the same price as the original firmware: \$229.85. Upgrades from the Ultimate ROM are \$49, and through January 1, Traveling Software is offering \$100 off with the trade in of selected ROM products. The Ultimate ROM II is also sold through Radio Shack's Express Order Software (EOS) — catalog number 90-0409 for the Model 100 version, number 90-4010 for the Tandy 200. Or, contact Traveling Software directly at 11050 Fifth Ave., Seattle, WA 98125, (800) 343-8080.

Circle No. 81

## So You Think You're So Smart

Test your knowledge of computers and data communications with a new game from Black Box Corporation called King Chip.

The game is comprised of more than 40,000 questions that will challenge the expert and computer novice. Categories include data communications, history and current events, hardware, jargon and acronyms, potpourri and software. The object is to correctly answer more questions than your opponent, thus moving around the board and being crowned "King Chip."

Questions are divided into five difficulty levels. Other handicapping rules equalize varying degrees of knowledge. Therefore a novice can take on an expert, a marketing manager can challenge a hardware engineer or a technical writer can square off with a software salesman.

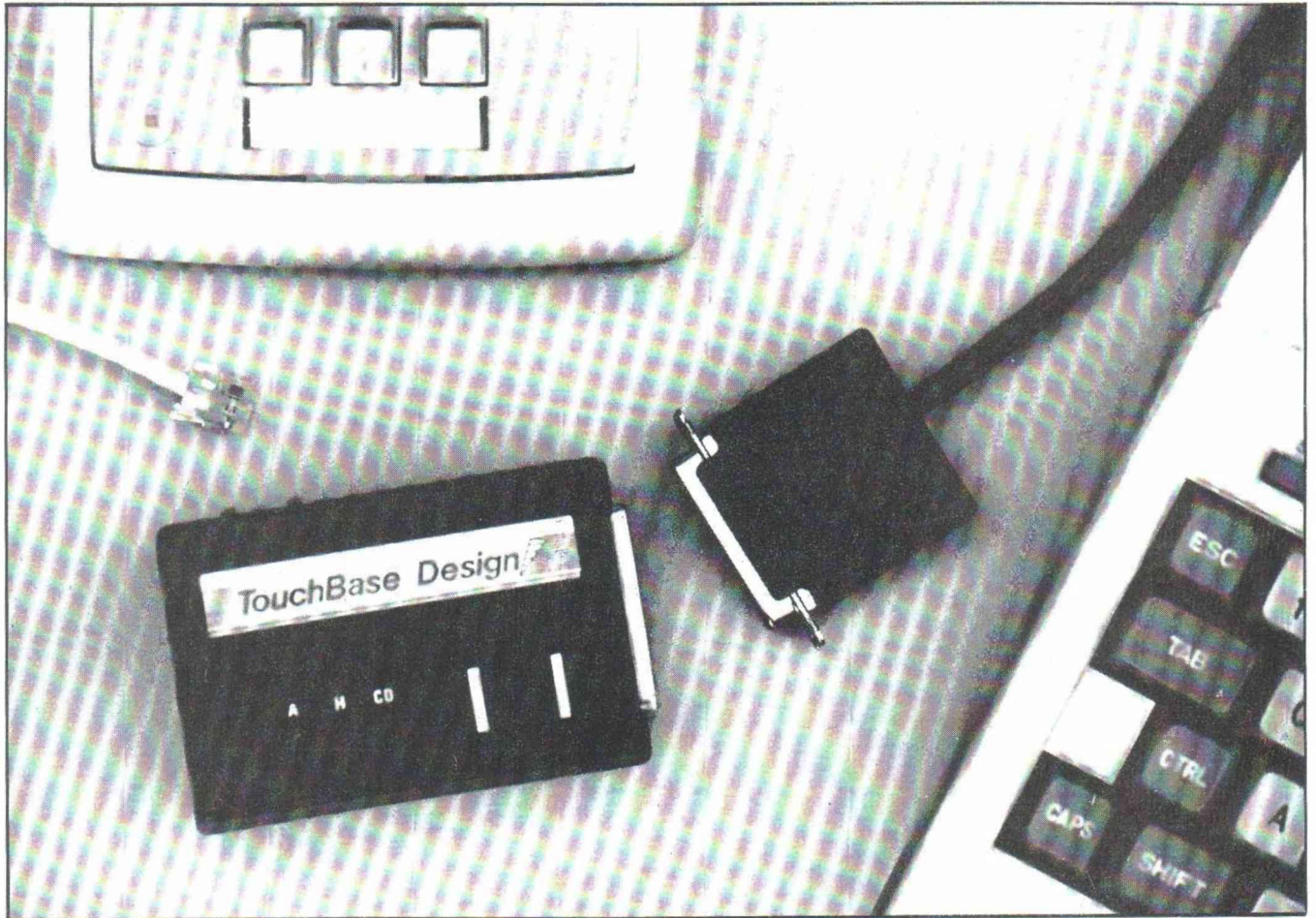
King Chip is available for \$39.95 from Black Box Corp., P.O. Box 12800, Pittsburgh, PA 15241.

Circle No. 82

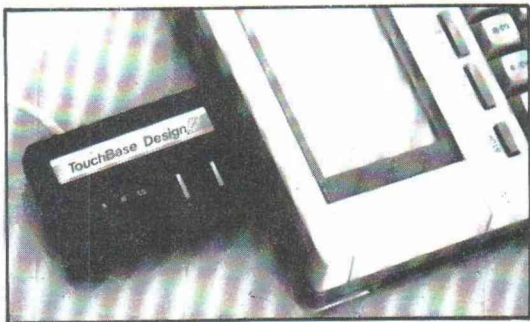


# 1200 Baud

*Why settle for less with your portable computer?*



## *The TouchBase TRAVELCOMM 1200 MODEM*



- Full featured
- Designed to travel
- Battery Power
- Auto 300/1200 Baud selection
- Weighs 6 oz.

*And, it fits in your shirt pocket!*

Contact your dealer, or ask us at

**TouchBase Design**

1447 So. Crest Dr., Los Angeles, Ca., 90035 (213-277-1208)



## Graphs for Your 100 or 200

Finally a graphics package you can call your own. Graph Pak from Data Transfer, Inc. produces line graphs, bar graphs, pie charts, scatter graphs and histograms on the Model 100 or Tandy 200.

Graph Pak is menu-driven and allows you to either read data from data files or input variables directly from the keyboard. It plots multiple sets of data points for comparing charts and graphs. It also lets you either supply your own labels and scaling parameters, or does it for you.

Graph Pak is available on cassette tape for the Model 100 and Tandy 200. Contact Data Transfer, Inc., 306 Ronco-cas Blvd., Ronco-cas Woods, NJ 08060, (609) 234-6506.

Circle No. 83

## Printing Secrets

Everything you ever wanted to know about Epson printers but were afraid to ask is covered in a new book from Mer-dyne Publishers, Inc. called *Epson Printers: Tips and Secrets*, by W.H. Dar-nall and D.B. Corner.

It contains a wealth of practical printer knowledge from how a dot ma-

trix character is printed to the secrets behind bit image graphics. It includes insider's techniques, troubleshooting tips — everything you need to use the full power of your Epson printer, and keep it in top condition.

*Epson Printers: Tips and Secrets* is available for \$19.95 from your Epson dealer or it can be ordered from Merdyne Publishers, Inc. 184 Fifth Avenue, New York, NY 10010. □

Circle No. 84

## Converting to New Horizons

A problem cropped up when a new in-dustry specification called RS-422 was developed to overcome speed and dis-tance constraints of the RS-232 inter-face. What do you do with all the RS-232 ports in the world?

You convert them with the new Model 63-2, RS-232 to RS-422 converter from Remark Datacom Division of Telebyte Technology Inc. The Model 63-2 sup-ports full duplex transmission from an RS-232 port while providing necessary conversion circuitry to accomodate dif-ferential input and output required by RS-422.

RS-422 utilizes differential signaling techniques to provide the capability of driving a twisted pair transmission line 4000 feet at 9600 bits per second (bps).

The 63-2 provides data transmission over 4000 feet of a twisted pair at 38,400 bps.

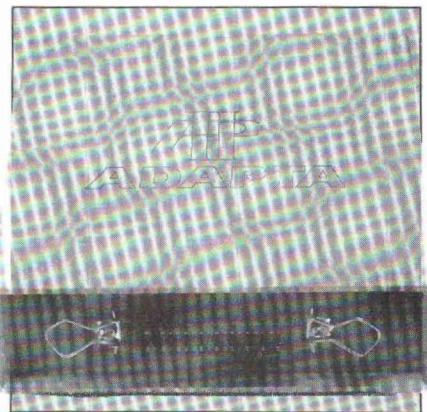
The Model 63-2 features a program-mable termination to allow matching the cable impedance into the RS-422 re-ceiver which reduces reflections and ringing.

Power is supplied by a wall mounted transformer which produces low voltage AC that's applied via an eight foot cord to power supply circuits in the 63-2. A 115 volt transformer is standard, but 220 volt units are optionally available.

The Model 63-2 is housed in a small aluminum container. Units are available at \$110 each or \$88 apiece in quantities of 100.

Contact Telebyte Technology, Inc., 270 E. Pulaski Road, Greenlawn, NY 11740, (800) 835-3298 or (516) 423-3232.

Circle No. 86



## What Disappears When You Stand Up?

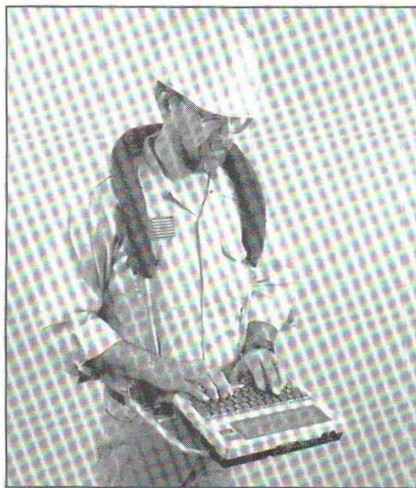
The trouble with portable computers is you need something to put them on when typing — a desktop or more com-monly a laptop. As journalists, construc-tion workers and others know, when in the field, these luxuries are not always available. Until now.

Hearthside Enterprises has developed Porta-Pro, an adjustable, light-weight aluminum frame for holding your Model 100 when your desk or lap can't.

Built for comfort, Porta-Pro is made of padded aluminum and can be adjusted to accomodate users of different sizes and shapes. And it folds for ease in stor-age and portability.

Porta-Pro attaches to your computer using the 100's front screw holes.

Porta-Pro is priced at \$99.95 and is now available for the Model 100. Devel-opment is underway on frames for other laptop computers. Inquiries are wel-come.



Contact Hearthside Enterprises, P.O. Box 609, N. Amherst, MA 01059, (413) 256-0050.

Circle No. 85

## While We're on the Subject

Performance Interconnect, Inc. has begun shipping an interface converter of their own. Only this one includes both parallel to serial and serial to parallel data conversion.

Called the Adapta, it comes with a switchable 2048 byte buffer and its own 9 volt AC adapter.

Serial features include eight select-able baud rates (110 to 19.2K baud), seven to eight data bits, one or two stop bits, selectable control signal polarity and DTR and CTS control logic. The se-rial connector is a standard DB-25.

The parallel interface uses ACK and BUSY to control the parallel port data stream. The connector is Centronics-type parallel.

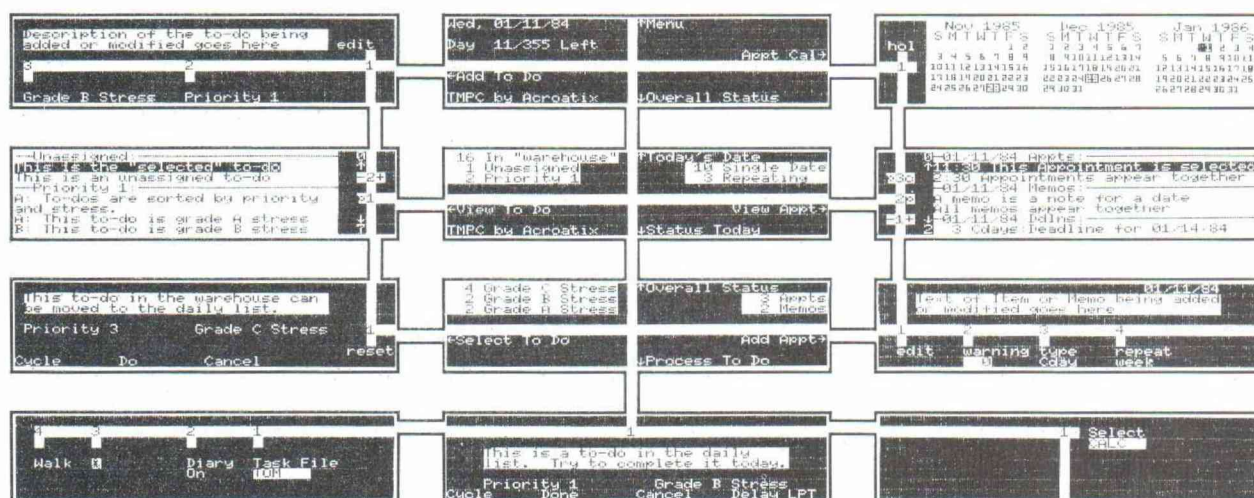
Suggested retail price is \$89.95. Con-tact Performance Interconnect, Inc., 8950 Villa La Jolla Drive, Suite 2144, La Jolla, CA 92037, (619) 457-0665.

Circle No. 87



# TMPC

## A Plan for Efficiency



For the TRS-80 Model 100

### More than a Calendar

TMPC helps you organize your day. It is more than a calendar program; it is a toolbox to help you keep your most urgent tasks at top priority.

### Efficiency is no Game

When you use TMPC, you enter the system of screens and corridors shown above and access features by moving through the rooms with the arrow keys. The screens may resemble an adventure game, but TMPC is a serious tool. The user interface will become second nature to you, like walking through the rooms in your home.

### Functions for Efficiency

Each screen has its own function. For example, one

screen includes a perpetual calendar, and another shows a "warehouse" of tasks to be done. In other screens you can set entries that repeat weekly, monthly, quarterly or yearly; request a warning of up to 999 days for any entry; sort your to-do list by stress level and priority; and more.

### Organization Philosophy

TMPC has more than just "features;" it has a *philosophy* of time management inspired by Stephanie Winston's best seller, *The Organized Executive*. You won't learn all there is to know about TMPC in five minutes, but after using it, you'll feel more *organized*, not just more computerized.

### Spreading the Word

One user told us that he felt *guilty* to get so much functionality at so low a price. Find out for yourself. Order TMPC today.

### TMPC by Ac'rō'ā'tix

\$49.95 + \$3.00 Shipping

For more information, including how to get a *Free Sample*, call or Write:

Acroatix Incorporated  
P.O. Box 273  
Wilmington, MA 01887  
(617) 658-5550

Phone orders only call

**(800) 225-5800**



COD or Courier shipment available at extra charge.



It's the Holmes Engineering/PCSG "chipmunk"

**PORTABLE**

# Disk Drive

for the Model 100/200

NOW  
AVAILABLE  
ON  
M-200

**\$499**

Includes a library of  
six powerful programs

Uses the main menu concept. You see the disk directory instantly, arranged on your M-100 screen like your main menu. Just move the widebar cursor and transfer files with a function key. You can run a file directly from the diskette with the ENTER key. Uses 3½" microfloppy diskettes that have a rigid plastic casing and a metal core. They're tough and nonflexible. You can carry several in a shirt pocket without damage. There's 358K on a diskette. Ten of these in your briefcase and you've got 3½ megabytes.

Drive weighs only three lbs. and it works directly from the 110 outlet and recharges at the same time. It recharges in six hours with thousands of pages transferred between charges. It's compact, with dimensions of 2¼" x 5½" x 7.5"; and fits easily into your briefcase along with your Model 100 or 200.

Machine code programs, BASIC programs, *Lucid* files and documents all are saved and retrieved with no protocol—instantly, ready to run.

In a special association, Holmes Engineering and PCSG have worked together combining the hardware knowledge of Holmes and the software expertise of PCSG. The result is a product that can only be regarded as excellent.

**You see the disk directory instantly; works just like the main menu**

Here is what is really exciting. The portable disk drive has Random Access. Included as part of the operating system in the drive (ROM) is a very powerful disk BASIC.

This means that you can have BASIC programs that will access the diskette and read and write records directly on the diskette.

Just imagine yourself with this kind of capability.

*Database*—The portable disk drive stores your mailing list, inventory items, part #s and descriptions or any other data that you need to recall.

## 358K on a diskette

*Invoice (purchase order)*—At the touch of a button you can print out your sequentially numbered, professionally done invoices. This is truly professional invoicing capability.

Purchase orders are just as easy.

*Sort*—This excellent utility allows you rapid sorting of any records you have compiled. You can write the newly sorted list back in the same file on the diskette or to a new file.

*Telecom interface*—If you are a user that likes to access other computers or databases (for example CompuServe) by telephone then this powerful facility alone is worth the price of the disk drive. You can automatically download and upload information onto the diskette.

*Calendar*—Everyone who has seen this program has said, "This is the first calendar/

diary/scheduler on any computer anywhere that I can use. It is so functional."

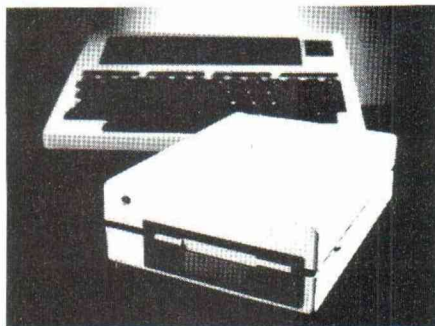
The calendar program is usable for two reasons, first it is designed correctly, and second you have the memory (358K) on the diskette to log and access a tremendous amount of notes over a long period of time.

*Personal Finance Manager*—This wonderful program truly lets you keep track of your finances.

All your records are kept on the diskette. Bank accounts (checking and savings) and charge accounts such as MasterCard and Visa.

We at PCSG believe we have the ultimate Model 100 system, the Portable Disk Drive plus the *Lucid* spreadsheet on snap-in ROM, *Write ROM* word processing and the new 64K RAM expansion now available from PCSG.

We want you to find out for yourself at no risk. If you aren't totally satisfied within 30 days, simply return the disk drive for a full refund. Priced at \$499.95, including the software library. MasterCard, Visa, COD.



**"Ask about our new \$399 budget model"**

PORTABLE  
COMPUTER  
SUPPORT  
GROUP

**1-214-351-0564**

11035 Harry Hines Blvd., #207  
Dallas, Texas 75229

**PCSG offers a 30-day/money-back trial!**

Circle 37 on Reader Service Card



# Tandy Takes The High Road

By J. D. Hildebrand

**A**mid speculation, controversy, prophecy, before-the-fact second-guessing and a fair amount of fanfare the Tandy 600 was introduced October 28, 1985.

The introduction followed months of media guesswork and official denials, most centered around a non-existent MS-DOS laptop capable of running programs written for the IBM PC. Speculation continued even following an official denial from Radio Shack market planning director Ed Juge.

For Tandy watchers and laptop-industry enthusiasts the Tandy 600 is immediately a disappointment. Never mind

that the benefits of IBM compatibility haven't been proved in the laptop market. Never mind that the 600 is easier to use than MS-DOS computers by several orders of magnitude. Never mind that it's got more power than most laptop users are ever likely to need. The widespread reaction will be that it's behind the times, obsolete upon introduction — not Tandy's best effort.

In introducing this system at this time, Tandy has chosen to follow a perilous strategy. The company isn't following the current wisdom that says users *want* MS-DOS laptops. Instead, they're focusing on feedback to the Model 100

and Tandy 200, introducing the system users say they *need*.

The success of the Tandy 600 will ultimately depend upon whether computer purchases are based on hype-fueled wants or business needs.

## SYNERGISM

Buckminster Fuller defined synergy as the quality distinguishing a system whose behavior couldn't be predicted from the behavior of its parts. All computers are synergistic systems to some extent. The Tandy 600 is more unpredictable than most.



PHOTOGRAPH BY BENJAMIN MAGRO

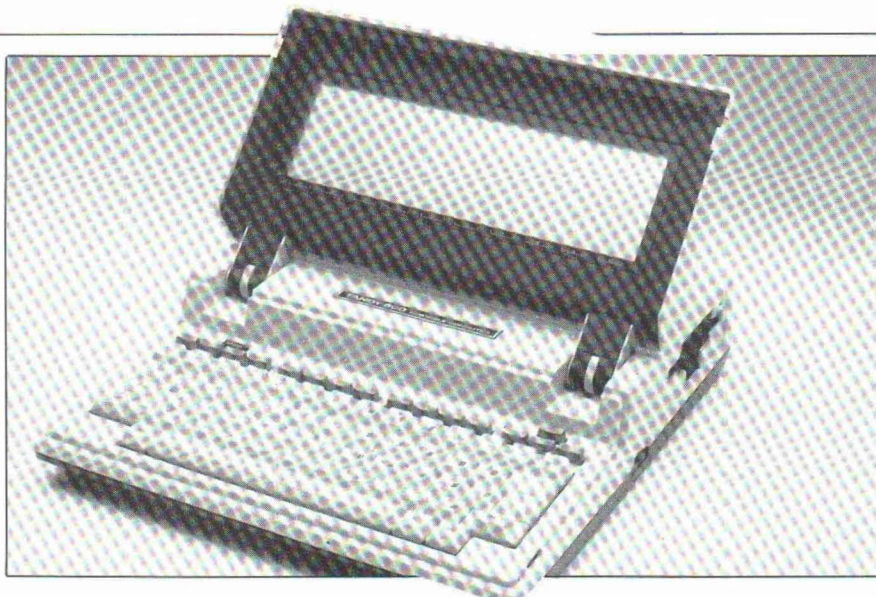


Still, a discussion of the whole is meaningless without some enumeration of the parts. For the record, here they are:

- 32 kilobytes (K) of random-access memory (RAM), expandable to 224K.
- A flip-up, 80 by 16 liquid-crystal display (LCD).
- A built-in 300 bits-per-second (bps) modem.
- An internal 3.5-inch disk drive that stores 360K of programs and data.
- A 16-bit 80C80 complementary metal-oxide semiconductor (CMOS) microprocessor.
- An RS-232 port and a Centronics-compatible parallel printer interface.
- An expansion bus for addition of an external floppy drive or other peripherals.
- Built-in rechargeable batteries, and an AC adapter/charger.
- Read-only memory (ROM)-based applications: System Manager, Word, Calendar, File, Telcom and Multiplan.
- One option ROM socket (accessible by removing Multiplan) that holds BASICS or other ROMs.

The entire package retails for \$1,599 with 32K of RAM. Memory upgrades from Tandy cost \$399.95 for each 96K of add-on RAM.

Like the 100 and 200, the 600 has a 72-key keyboard. Current Tandy laptop users will feel comfortable with its layout: 10 programmable function keys, an embedded numeric keypad, plus dedi-



*The 600's 16-line, 80-character display locks at any convenient viewing angle.*

cated keys for Break/Pause, Print, Ctrl, Label, Alt and Num.

A recessed button marked "Power" sits above the first four function keys, just where a similar button is placed on the 200. However, its operation is different. The 200's pop-up button is designed to turn the computer on and off when users open and close the case. But Tandy found users got into the habit of turning the computer off when they were done. Then when they closed the case they turned it back on, diminishing battery life. So the 600's power must be turned on and off deliberately.

Power is an important issue with the 600. Because Tandy rates its battery life at just six to 11 hours (depending on disk, printer and RS-232 use), the built-in nickel cadmium batteries, or nicads, need frequent charging. This is probably Tandy's poorest design decision. Imagine you're traveling on business when your power runs low. Would you rather pull some spare batteries out of your briefcase and replace them, or find a power outlet to plug in the bulky recharger and leave the computer sitting for 14 hours to recharge?

Compounding the problem is the fact

## How the 600 Fits In

| Model               | Price   | Screen/Modem     | Memory               | Applications  | Storage              |
|---------------------|---------|------------------|----------------------|---|----------------------|
| Model 100           | \$599   | 8x40 LCD<br>yes  | 24K RAM<br>32K ROM   | BASIC, TEXT, TELCOM,<br>SCHEDL, ADDR5                       |                      |
| Epson<br>Geneva     | \$995   | 8x80 LCD<br>no   | 64K RAM<br>32K ROM   | CP/M, BASIC, WordStar,<br>Portable Calc, Portable Scheduler | internal<br>cassette |
| NEC<br>Starlet      | \$995   | 16x80 LCD<br>yes | 64K RAM<br>32K ROM   | CP/M, BASIC, WordStar,<br>Portable Calc, Portable Scheduler |                      |
| Tandy 200           | \$999   | 16x40 LCD<br>yes | 24K RAM<br>72K ROM   | BASIC, TEXT, TELCOM,<br>MULTIPLAN, SCHEDULE, ADDR5          |                      |
| Tandy 600           | \$1,599 | 16x80 LCD<br>yes | 32K RAM<br>160K ROM  | WORD, CALENDAR, FILE,<br>TELCOM, MULTIPLAN                  | 360K micro-floppy    |
| Data General<br>One | \$2,695 | 25x80 LCD<br>no  | 256K RAM<br>32K ROM  | MS-DOS, BASIC, memo writer<br>terminal emulation            | 360K micro-floppies  |
| HP 110              | \$2,995 | 16x80 LCD<br>yes | 272K RAM<br>384K ROM | MS-DOS, MemoMaker, Lotus<br>1-2-3, terminal emulation       |                      |



# What People Are Saying About Traveling Software . . .

For TRS-80 Model 100, NEC PC-8201, and Olivetti M10 laptop computers:



*"This thing is fantastic. I can write proposals in about 50% of the time it took previously. I can organize presentations better — I use it for just about everything."* ☛ Jonathan W. Pearce, C.P.A.

*"I found it an invaluable tool. It has become as much a part of my 100 as Text and Telcom, like a second skin."* ☛ John P. Mello, Portable 100/200, March, 1985

Organize anything from simple lists to complex outlines. Easily reorganize and search. Use word processing and database capabilities. Develop outlines from rough drafts into complete papers. \$79.95

## T-backup TM

*"Your program is super, and a real time saver."* Bruce Arnold, special sales manager.

*"Your T-backup program is the most useful that I have ever purchased for my Model 100. Keep up the good work."* ☛ Thomas Fehsenfeld, customer.

Save the entire contents to cassette from RAM in minutes, rather than back up files individually. Check the integrity of saved data copies. Restore data from cassette. \$19.95

## T-base TM

*"Cracking the complexity of a relational database manager into a portable computer... may seem ambitious... Yet Traveling Software's T-base handles the challenge with surprising grace..."* ☛ P. Gregory Springer, InfoWorld, December 10, 1984

Design relational data bases. Set up screen files. Borrow information from fields in other data bases. Perform math computations. Create custom-printed or LCD display reports. \$99.95

## T-Writer TM

*"...all that it is advertised... superior in many aspects to the WRITE+ program that I used previously."* ☛ John J. Atkins Jr., food service director.

Print documents created using the built-in TEXT program. Include justification, headings, footings, underlining, italics, bold-face, and more. Produce form letters and mailing labels. \$49.95

## Traveling Appointment Manager TM

*"The program and manual were user friendly... an excellent value."* ☛ Mary Jeann Batham, Portable 100/200, May 1984

Maintain a detailed list of appointments and things-to-do. Consult on-screen or printed records. Automatically reschedule recurring appointments. \$59.95

## Traveling Expense Manager TM

*"...the Traveling Expense Manager is well-thought-out and keeps track of exactly the type of information that you need while you are on the road. It's everything you need to keep your boss — and the IRS — happy."* ☛ Dan Robinson, InfoWorld, July 30, 1984

Define expense categories. Record expenses to any account. Indicate if a business expense is billable. Produce reports by client or project, and the type of expense. \$59.95

## Traveling Project Manager TM

*"...very useful in helping me track my projects... simple... provides useful data and printouts."* ☛ J. Michael Masterson, strategic projects manager.

Simultaneously manage several projects — small or large. Enter dollar or other unit expenditures. Produce a variety of summaries and printed reports. \$59.95

## Traveling Sales Manager TM

*"I spend a lot of time on the road and find the Traveling Sales Manager useful... The manual, in particular, was outstanding."* ☛ Don Gillespie, salesman

Keep a detailed log of customers and contacts. Record what customers purchase and when. Store important biographical data and reminders to call on customers. \$59.95

## Traveling Time Manager TM

*"...first-class software, a valuable tool for consultants and others billing clients by the hour."* ☛ John P. Mello, Portable 100/200, April 1984

Track time spent on projects or for a client. Apply your own billing rate. Identify time expenditures as billable or nonbillable. \$59.95

CALL 1-800-343-8080

CALL (206) 367-8090



Traveling Software, Inc.  
11050 Fifth Avenue, N.E.  
Seattle, WA 98125  
(206) 367-8090



W  
E  
L  
C  
O  
M  
E  
S

# TELECOMMUTER™

## INTEGRATED WORD PROCESSING AND COMMUNICATIONS SOFTWARE

For the Tandy 1000, 1200 and 2000, and IBM-PC/XT/AT and compatible computers. Uses all the Model 100/Tandy 200 TEXT and TELCOM commands.

## WHY BUY JUST FILE TRANSFER? TURN YOUR DESKTOP COMPUTER INTO A 'SUPER MODEL 100/TANDY 200'!

For \$200 you can put all this on your desktop computer:

- Full function Word Processor based on and compatible with Model 100/Tandy 200 TEXT Editor.
- Super Power Communications based on and compatible with Model 100/Tandy 200 TELCOM.
- Fast File Transfer between Model 100/Tandy 200 and desktop at 9600 baud. Fully prompted at every step so you'll never get lost. And we supply the cable at no extra cost!
- Host Mode for remote control of desktop computer from Model 100, Tandy 200, dumb terminal, or any computer with Telcom capability.

You don't have to put extra code on your Model 100 or Tandy 200 to transfer files — **no cassettes, no ROM cartridges**. Telecommuter will exchange files with any computer that has an RS-232 port and communications software, even another desktop computer.

Optional advanced features include XMODEM protocol file transfer, full VT100 terminal emulation, Telcom scripts and macros for automatic dialup and file transfer, DOS access from editor, and multiple access level Host Mode. **TC-Corporate** allows individual user assignments, such as password, access level and time limit; keeps activity log.

**Telecommuter** is a new and significantly easier way to use your portable and desktop computers together. Call or write today for more information on our entire line of fine software products.

We accept MasterCard and VISA for mail or telephone orders, and we ship free in the USA. Upgrade any time for price difference.

**TC-standard** or **TC-XMODEM** \$200, **TC-DeLuxe** \$300, **TC-plus** \$400, and **TC-Corporate** \$1000.

Look for Telecommuter at your local Radio Shack Computer Store!

## **SIGEA SYSTEMS, INC.**

**19 Pelham Road, Weston, MA 02193 (617) 647-1099**



## TANDY 600

that running the unit from AC power via the recharger/adaptor doesn't recharge the batteries. And the user manual cautions, "Always allow enough time for a full charge when recharging the batteries." You've had your six to 11 hours of use — now leave the computer alone for 14. This restriction limits the 600's use as a portable.

Further compromising portability is the 600's sheer bulk. Users marvelled at the 200's specs — 11.75 by 8.5 by 2.25 inches, it weighs just 4.5 pounds. The 9.5-pound Tandy 600, in contrast, measures 12.75 by 11.5 by 2.5 inches. It's too big to fit into a briefcase and too heavy to carry far without major motivation.

Is this a fair complaint? Yes and no. A

computer this big, especially one without a handle, isn't conveniently portable. But it's probably the smallest computer you can build with an internal disk drive. If portability is more important to you than disk storage, choose the 100 or 200. If you need a drive, the 600's for you.

The 600's 80-character, 16-line LCD isn't as readable as the 100's or the 200's. This probably isn't a fair complaint either; the 100 and 200 have the most legible LCDs in the industry, and anything else suffers by comparison. On its own merits the 600's screen is perfectly readable under most lighting conditions, at least for short periods of time. A thumbwheel on the side of the com-

puter allows users to vary contrast, and the unit's case mechanism allows the operator to lock the screen at virtually any angle.

### MICROSOFT WORKS

The key to the 600 is its bundled software, developed — like MS-DOS and the firmware that comes with Tandy's other laptops — by Microsoft of Bellevue, Washington. The ROM-based programs are collectively called Microsoft Works, and they include a System Manager, Word, Calendar, File, Telcom and Multiplan. In a departure that gives keen insight into Tandy's plans for the 600, BASIC isn't included. This computer is for professional users, not primarily for hobbyists or programmers. For the latter, a \$129.95 BASIC ROM is available. It fits into the unit's single option ROM socket, replacing Multiplan.

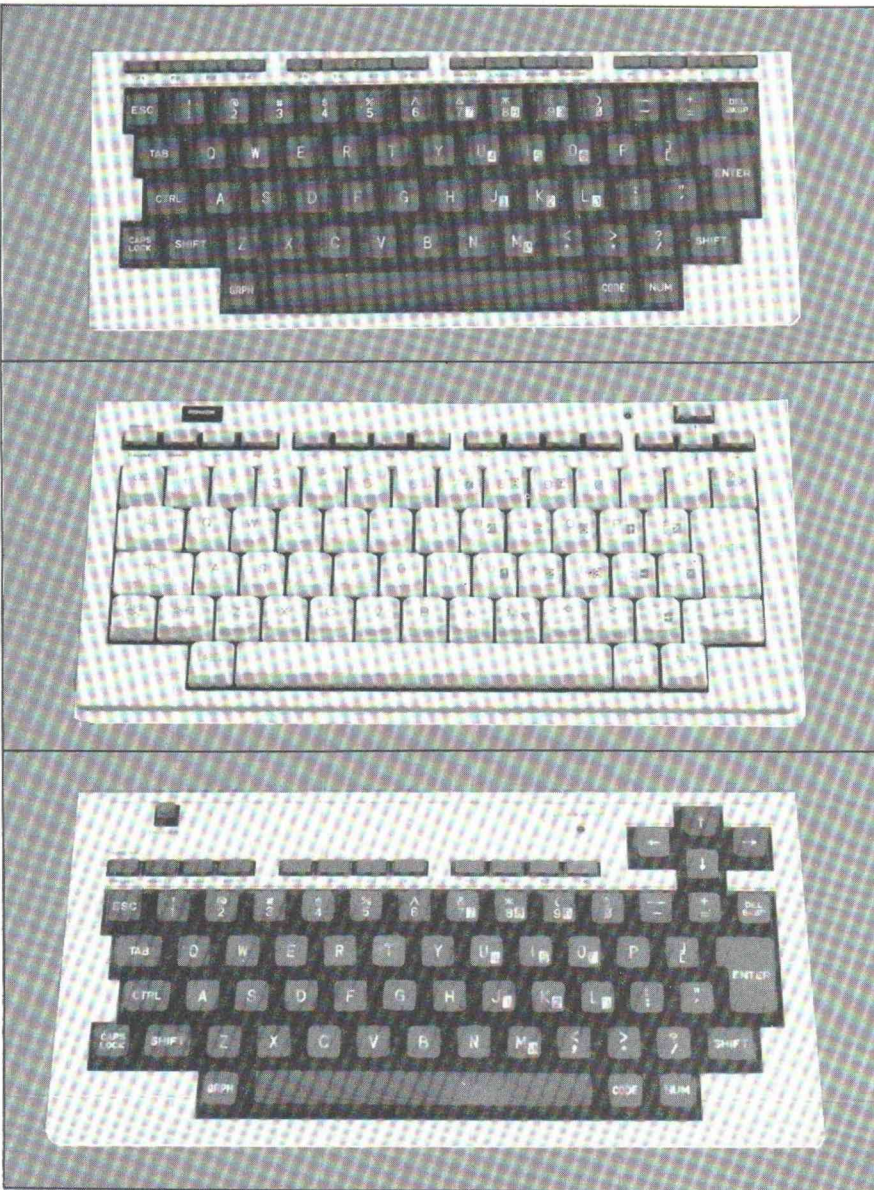
The 600's 80C88 microprocessor — a CMOS version of the 16-bit chip that controls the IBM PC — is capable of addressing far more memory than the eight-bit chip inside the 100 and 200. The prospect of 224K of RAM should have most current Tandy laptop users foaming at the mouth, or drooling a little at least.

Expansion memory is expensive but important. Each of the built-in applications requires work space (ranging from 3,700 bytes in Word to 6,500 bytes in Telcom). While the built-in disk drive makes memory-based file storage space less necessary, most users will probably purchase at least one 96K RAM upgrade. Economies of scale and third-party suppliers should eventually drive the cost of the upgrade far below Tandy's current \$399.95 retail price.

In contrast to the "invisible operating system" that controls the Model 100 and Tandy 200, the 600's System Manager is dismayingly visible. This is the first Tandy laptop you can't thrust into a new user's hands confident of immediate adoption. Hours of practice and thorough manual reading are required. With practice, using the 600 could eventually become second nature, but never intuitive.

When you turn the computer on you're confronted with a list of applications and a command line across the bottom of the screen. The arrow keys step you through the applications, allowing you to highlight selected programs with the familiar wide-bar cursor.

The space bar moves a second wide-bar cursor over the commands that appear on line 14 of the 600's LCD. You may select Copy, Delete, List, Name, Options, Run or Set. These are operating



*Like its tiny Tandy cousins, the 600 (center) has a 72-key keyboard with an embedded numberpad.*



## Method in Tandy's Madness

*Though this be madness, yet there is method in 't.*

William Shakespeare  
*Hamlet, Act II, Scene 2*

Everyone expected Tandy's next laptop computer to run MS-DOS. *Everyone.* IBM-compatible laptops are the next big thing, after all, and anyone who introduces one will quickly and automatically become rich. Right?

Wrong. IBM-compatible laptops were released at an astonishing rate during the past 12 months, beginning with the introduction of the Hewlett-Packard 110, Texas Instruments Pro-Lite and Data General One in late 1984. Today more than 20 such units are available from almost as many vendors. Market analysts continue to cite surveys proving conclusively that the PC-in-a-briefcase will meet unheralded success among corporate buyers who need full-

powered computers they can carry around.

Reality hasn't kept pace with the analysts' predictions. The truth is that the MS-DOS laptops currently on the market don't sell in the consumer marketplace. They're the perfect solution to problems virtually no one has.

To be fair, some IBM-compatible laptop vendors have found limited success in vertical and niche markets. Grid Systems Corp. has posted slow but steady growth specializing in government and military applications. Auditors prefer the DG One. The TI Pro-Lite has evolved into a portable adjunct to a desktop artificial intelligence workstation based on the TI Professional. But these are small successes compared to the researchers' prophecies and the vendors' hopes.

Let's face it. The number of executives affluent enough to part with \$6,000 for a complete IBM-compatible laptop system and gung-ho enough to recalculate Lotus 1-2-3 spreadsheets at 35,000 feet in-

stead of relaxing over a cocktail with their compatriots is limited. Severely limited.

Contrast the philosophy behind these products with the thinking behind Tandy's laptop line and you'll see a clear distinction. The other manufacturers design the most sophisticated laptops technology allows, build them, and think about the users later. Tandy designs systems based on what users need.

Tandy has confounded the analysts and the second-guessers by refusing to introduce an IBM-compatible laptop — a task the company is singularly well qualified to do. The 600 pleases, but doesn't astound. It fails to blaze new technological trails.

Tandy's main distinction from the rest of the industry, most of whom are suffering reduced sales and layoffs, is commitment to the user's needs and priorities. It's an old-fashioned approach to doing business, but it serves the company well.

—J.D. Hildebrand

system utilities that allow you to manipulate files, set the system clock and configure the computer for a given printer. So far so good, except that you've got two input modes governing selection of a file or program.

But that's not all. Toggle the Label key (the command line disappears) and you'll see definitions for the system's 10 programmable function keys. Press Shift-Label and you get a second set. Ctrl-Label yields a third set.

Confused yet? Hang on. There's more.

Press F3 and the list of applications at the top of the screen disappears, replaced by a second screen that includes the programs along with the data files associated with them. So if you've created text files with Word, they show on one of the screens but not the other.

Now insert the utility disk that comes with the system. It has programs for formatting and copying disks, installing device drivers and so on. (Device drivers? Is this really a Tandy laptop?)

Tap F3 to display the installed applications and — nothing from the disk appears. You have to instruct the computer to search the disk drive for applications with a command confusingly called "Options."

The Options utility prompts the user for a drive name. Search the manual and you'll find the internal drive is named A.

(Options accepts any single letter as a drive name, but B through Z refer to external units. You don't get an error message — but you don't get any data from the drive, either.)

Once you've used the Options command to inform Microsoft Works that there's a disk in the drive, the applications display changes. Below the built-in applications are mysterious entries: .!60, .!70, .!90, .DVR and .LIB. Next to these in a second column are the names of the programs on the supplied utility disk: Format, Install, Diskcopy, Printer, Dbcalls. The gibberish in the first column turns out to be file extensions like the .BA and .DO extensions used by the Model 100.

Now that the system knows where to find the disk-based applications you can run them with the Run command, right?

Wrong. Before the 600 can execute any disk-based program (or manipulate any disk-based file) the user must load it into RAM with the Copy command. It really isn't all that complicated — it's all explained on page 237 of the Owner's Manual.

There's a logic behind these operations that eventually makes sense, but the fact remains: The 600 isn't as intuitive, friendly or simple as the 100 and 200. Before the owner can use it, he or she must do some homework.

### BUILT-IN APPLICATIONS

The Word that comes with the 600 bears no true relationship to Microsoft's similarly titled desktop-computer classic. It is nonetheless an excitingly powerful and easy-to-use product.

Editing commands are available via the programmable function keys in regular, shifted and Ctrl modes — a total of 30 options. The program supports both one-by-one and global search-and-replace, and includes a strikeover option for those users frustrated with the 100's insert-only dictum. Right justification, page numbering, variable tab-setting, paragraph formatting, centering, negative indenting, margins and on-screen repagination are all available.

A unique feature is Word's Jump % command, which allows the user to scroll immediately to an approximate place within a document — 50 percent through, for example, or 75 percent through. Jump Page scrolls immediately to the top of the selected page of documents that have been paginated on the LCD.

Tandy's owners manual claims that Calendar is merely an appointment manager, but its potential applications are actually much broader. The program is a primitive project manager that allows users to define and view the starting and ending dates of subtasks that make up a



**Changes your Model 100 into a totally different computer with capability you never thought possible.**

**Lucid<sup>TM</sup>**  
on Snap-In<sup>TM</sup> ROM

Infoworld  
rated Lucid's  
performance  
"excellent"

**NOW  
AVAILABLE  
ON  
M-200**

**PCSG says "Satisfaction Guaranteed  
or your money back within 30 days!"**

LUCID<sup>®</sup> is here now. It is on a ROM cartridge that snaps into the compartment on the back of your Model 100. It takes no memory to load and no memory for operating overhead. That means you have the full 29.6k bytes free to store your data.

First, LUCID<sup>®</sup> is memory conserving. It will let you build a large spreadsheet—255 row by 126 column capacity. You build huge spreadsheets in your Model 100's RAM that could consume 80 to 100K on a desktop computer.

Secondly, LUCID<sup>®</sup> is fast. LUCID<sup>®</sup> is so rapid, a 36 column corporate financial statement took less than 4 seconds to calculate.

Thirdly, LUCID<sup>®</sup> has features you won't find in most other spreadsheets. For example, when you type a label (text) it will cross column boundaries; in other words when you type a label or title it will appear as you type it irrespective of column or width. LUCID<sup>®</sup> also allows you to set column widths individually, and of course LUCID<sup>®</sup> has insert row and insert columns, as well as other standard features. LUCID<sup>®</sup> even lets your formulas refer to cells in other spreadsheet files.

Further, LUCID<sup>®</sup> has what no other spreadsheet has: Cut, Copy, and Paste. It uses the same keys as Cut and Paste in TEXT, but here's the difference: it takes all the formulas with it when you paste and they all automatically recalculate with the entire sheet.

And here is what is really amazing. You can copy or cut from one spreadsheet and paste into another spreadsheet or even a TEXT file.

LUCID<sup>®</sup> supports all BASIC math functions as well as Log, sine, cosine, tangent, exponentiation and other sophisticated math functions.

LUCID<sup>®</sup> has so many features that you will say "this is what I need in a spreadsheet", such as automatic prompting of an incorrectly typed-in formula showing just where the mistake was made.

LUCID<sup>®</sup> has expanded "go to" functions that remember and produce a windowing capability.

But perhaps most remarkable is that LUCID<sup>®</sup> is not only a spreadsheet but a program generator as well. First, LUCID<sup>®</sup> lets you protect all cells against entry or change, and then unprotect just the cells you want for someone else to use as input fields.

LUCID<sup>®</sup> will not only process values, but text input as well so that the facts other than numbers can be responded to. LUCID<sup>®</sup> has the ability for you to refer in a formula to cells containing words. This feature combines with the capacity of doing "if then" statements that work by doing table look-ups against even massive X/Y charts of text or numerical information. You can produce a program that responds to inputs with no programming knowledge whatsoever.

You can prepare a report section in your spreadsheet with instructions to your user for printout, and they can produce a personalized printout that responds to their input. All your formulas and tables that did the calculations and provided the facts are invisible to that user. LUCID<sup>®</sup> is useful for doctors for patient questionnaires, troubleshooting technicians, purchase clerks, people doing job quotes, stores for customer workups, insurance agents and anybody who needs to process specific facts and numbers to produce a report based on those responses.

LUCID<sup>®</sup> comes with a manual that explains not only the characteristics of LUCID<sup>®</sup>, but will train you how to use a spreadsheet even if you have never seen one before. You are shown how to do budgets, forecasts, breakeven analysis amortizations and many other types of personal and business reports and calculations.

User friendly is such an over-used term in this industry, but a typical comment has been "I have never seen a spreadsheet that does so much, and yet LUCID<sup>®</sup> is so much

easier and faster to use."

LUCID<sup>®</sup> is a result of a most exhaustive developmental effort in which PCSG's objective was to develop a spreadsheet that was better than the state-of-the-art. We are so pleased because LUCID<sup>®</sup> provides for the Model 100 spreadsheet capability you cannot equal on a desktop computer.

LUCID<sup>®</sup> is, in our opinion and that of those who have examined it, a breakthrough. We sell it on a 30 day trial. If you are not completely satisfied, return it within 30 days for a full refund. Priced at \$99. on snap-in ROM. MasterCard, Visa or COD.

© PCSG 1984

First with  
software for  
the Model 100

PORTABLE  
COMPUTER  
SUPPORT  
GROUP

**1-214-351-0564**

11035 Harry Hines Blvd., #207  
Dallas, Texas 75229



# PORTABLE BASICS

For your Model 100, TANDY 200,  
or NEC 8201

**UTILITY PROGRAMS:** Everyone needs at least one of these programs. *THEY ARE AN EXCEPTIONAL COMPUTING VALUE.* Written in BASIC — No conflict with Machine Language programs, DVI, or other peripherals. Only \$14.95 for your first program, \$9.95 for each additional one (in the same order). Buy 3 and choose a 4th program free!

**RENUMBER** — 2K — Renumbers Basic Programs in place. (Models 100 and 200 only).

**DISASSEMBLER** — 1.3K — Perhaps the smallest disassembler around. Output to LCD, LPT, RAM, COM, or CAS.

**ASSEMBLER** — 2.2K — Compile your own machine language programs. Improved to 150 bytes/minute.

**CONVERT** — .5K — Conversions between Decimal, Hex, and Binary numbers.

**HEXSAVE** — .5K — Save and Reload Machine Language programs using ASCII data. Allows uploading to your desktop computer.

**ANNUITY CALCULATOR** — 1.5K — Present Value, Future Value, Payments, Interest Rate. Compare loans or plan for the future!

**CALENDAR** — 1K — Display any month since 1582 AD! Scroll forward, backward, or enter new month with one key.

**TIMER/ALARM** — 1 K — Countdown timer, stopwatch, or alarm. Perfect for eliminating missed wake-up calls!

**FILE SIZE** — .6K — Display the RAM address and number of bytes used by each of your files. Helps with memory management.

**LINE FEED** — .3K — Enable/Disable Line feeds instead of flipping DIP switches. Status displayed or changed from main menu. (Models 100 and 200 only).

**SCREEN DUMP** — .5K — Send Graphics to your printer! Most Daisywheel and Dot Matrix printers can be used. Send us your printer control codes so we can set up the program for you.

**STATISTICS** — 1K — Compute Mean, Standard Deviation, and Variance of a Normal distribution. Reads data from a text file.

**WEIBULL STATISTICS** — 1K — Characteristic Life, Reliability, and Confidence. Multiple Samples, Suspended Tests.

**MACHINE LANGUAGE PROGRAMS:** \$17.95 each. All of them are Relocatable! And none of them need any free RAM. None.

**CASSETTE** — 2K — Back up all your files at once. Only takes 4 minutes for a 32K save or load. (Models 100 and 200 only).

**SCREEN DUMP** — .5K — Similar to the BASIC version, but much faster. Send us your printer codes when ordering this.

**ASSEMBLER** — 1.4K — Includes ORG, DATA, STR, RES, EQU, and \$ pseudo-ops. Compact and FAST!

Need something that isn't here? **CUSTOM** Software services available, too. Send me your application, I'll send you a quote. Most jobs \$50-\$250.

These are good, well-written programs. Don't let their size fool you. A lot of work was done to insure minimum use of your portable's RAM. The prices are low because the author and seller are the same person. That also means excellent customer support!

**Complete collection of all programs \$59.95**

#### ORDERING INFO:

Add \$2.00 S&H per order. Michigan Residents add 4% sales tax. Checks, MasterCard, and VISA accepted. No Purchase Orders unless payment is included. No COD's. Thank You very much!

**PORTABLE BASICS, INC.**  
**P.O. Box 696**  
**Comstock, MI 49041**  
**616-343-9315**



complete job — and to assign them priorities. Based on monthly calendars and daily lists of events, the program is as easy to use as it is powerful. It even includes an alarm that beeps at the user when it's time to start an appointment — even if the computer is turned off.

File is similar to the database subprogram of Lotus 1-2-3. It arranges records and fields of data as rows and columns of a spreadsheet. Simple, clear commands allow the user to specify the type and format of data that can be included in each column (field), and to sort the database in ascending or descending order based on any field.

What File lacks is a report generator. However, it does share data files with Word and Multiplan. While it isn't a true database manager, it does organize information and help verify its accuracy.

Telcom is a more powerful version of the Model 100's TELCOM, with some important additions. The program has four modes: Command, Script, Terminal and Answer.

Command mode is the most similar to Model 100 TELCOM. The screen clears except for the command line, which reads Answer, Connect, Disconnect, Modify, Options, Run, Script and Transfer. Modify is similar to Model 100 TELCOM's STAT, but presents a menu of communications options instead of forcing the user to wing it. Users can set word length, protocol, baud rate, parity, duplex, stop bits and more from the menu. Connect is similar to Model 100

TELCOM's CALL option.

Script mode is a fancy name for the program's auto-logon and auto-dial functions. Prompts guide the user through established session scripts. (Choosing Respond, for instance, prompts the user with *Respond to: . . . With:*) With the 600's Set Wake command option, it allows the operator to direct the computer to wake up in the middle of the night, log onto CompuServe or The Source, send a message, download data and log off — all in unattended mode.

Terminal mode is just like Model 100 terminal mode. It's the state the computer is in when it is communicating with another computer.

Answer mode allows the 600 to function as a simple bulletin board. The operator can instruct the computer to answer the phone, prompt the remote user for a password, transmit and receive information, and hang up.

Tandy 600 Multiplan is similar to Tandy 200 Multiplan, except that the larger LCD makes its use more convenient and practical. Microsoft's ROM-based laptop implementation of Multiplan is powerful and useful.

## CO-RESIDENT FUNCTIONS

In addition to the applications that appear on the menu, two utilities are almost always available via function keys.

Calc is an adding-machine emulator that appears in a window at the right side of the screen. It allows users to total a column of numbers quickly without interrupting a Word or File session. It's

most convenient when used with the embedded numeric keypad.

Alarm displays any appointments from Calendar whose start times have passed. It allows users to postpone or reschedule appointments without ceasing work.

## POSITIONING IS ALL

Tandy frequently surveys its users for feedback on its computer products. That's how the 200 was born — Tandy found that corporate clients needed a slightly larger screen, a spreadsheet and so on.

This was also the process that led to the introduction of the 600. But in this case the survey was more likely based on non-users than users. The Tandy 600 meets the objections of corporate buyers who rejected the 100 and the 200 as too limited. As such, it's probably not the right computer for users who are happy with their current Tandy laptops.

The best-selling laptop computers on the market are the Model 100 and its NEC counterpart, the 8201, both of which were designed by Kyocera in Japan. Second on the list is the Hewlett-Packard HP 110, a nine-pound portable with built-in word processing, telecommunications, spreadsheet and simple filing firmware. These specifications are almost identical to the Tandy 600's.

Further similarities suggest that the 600's design was dictated in part by the success of the HP 110. Both have 16-line, 80-character LCDs, for instance. Both have 300-bps modems. Both communicate conveniently with desktop computers — the HP 110 via a proprietary interface card and the 600 via serial port-to-serial port communications and a null modem. Both feature proprietary operating systems.

In the 600, Tandy has delivered a product competitive with the second-best laptop on the market — at half the price. Better, even — one of the main complaints against HP's portable is its lack of an internal disk drive.

Maybe this is the reasoning behind those features of the 600 that make Model 100 and Tandy 200 users shake their heads in bewilderment.

After all, Tandy was *already* responsible for the best-selling laptop of all time. With this one stroke the company may steal the second largest share of the market from the competition. □



The 600's specs are suspiciously similar to those of the \$2,999 HP-110 from Hewlett-Packard.

Please help us rate this article's value. If you've found it very valuable, circle 164 on the Reader Service Card. If it was moderately valuable, circle 165—and if it wasn't valuable to you, circle 166.



# A Clock-Work Tandy

By Alan L. Zeichick

**T**ime is Money. That's the theme that we expounded in the July, 1985 issue of Portable 100/200. Five months later, we have another theme: Time is Fun.

For some arcane reason, clock programs are always favorites. I've written lots of clocks for IBM 370 mainframes, my old TRS-80 Model III and various IBM-compatible microcomputers.

Less than 24 hours after I saw my first Model 100, I had completed a small analog clock program in BASIC. That program, in addition to drawing groans from the Portable 100/200 staff, taught me how the little wonder worked.

Some programmers use prime number generation as a programming benchmark. Others use disk-based random-

access file sorting. So, what's wrong with clocks?

## LITTLE BOXES

When the Tandy 200 appeared, everyone said, "Oh, no! Not another clock program!" So, I didn't write just any old clock — I created a random-pattern masterpiece.

The Tandy 200 analog clock, BIGBEN.BA, does more than give the time — it displays an ever-changing pattern of dots on either side of the clock. Why? Don't ask.

Features such as alarms, hourly chimes and a sweep-second hand aren't included in this implementation. Feel free, though, to add any features your imagination desires.

## ALAN IN PROGRAMLAND

The BIGBEN.BA listing is pretty straightforward.

Lines 1000 through 1220 indicate the commands used to control BIGBEN and variables used in the program. Pressing Z zeros the seconds — useful for synchronizing with a time signal. R redraws the clock face if the random pattern becomes too atrocious. The M key (or F8 if defined to MENU) returns to the Tandy 200 main menu screen.

Variables and the BASIC environment are initialized between lines 1240 and 1280. The variable RD is set to the reciprocal of the number of radians in a circle. This constant is used for the angle calculations for the clock's hands.

(Text continues on page 54)

### Listing 1: BIGBEN.BA.

```

1000 ' Alan L. Zeichick
1010 ' Analog Clock for Tandy 200
1020 '
1030 ' Keys Used
1040 ' -----
1050 ' M, F8   Return to MENU
1060 ' R       Redraw clock
1070 ' Z       Zero out seconds
1080 '
1090 ' Variables Used
1100 ' -----
1110 ' AP$      AM/PM flag
1120 ' DX       Dot X-coordinate
1130 ' DY       Dot PSET/PRESET flag
1140 ' HX       Hour X-coordinate
1150 ' HY       Hour Y-coordinate
1160 ' IN$      Keyboard input
1170 ' RD       Constant for radians
1180 ' MX       Minute X-coordinate
1190 ' MY       Minute Y-coordinate
1200 ' OH       Old hour
1210 ' OM       Old minute
1220 ' TS       Old time

1230 '
1240 CLEAR 100
1250 DEFINT D, O
1260 CLS
1270 OM = 99
1280 RD = 3.1415926535#/180
1290 '
1300 ' Put in the box
1310 '
1320 LINE (0,0)-(239,123),1,B
1330 LINE (58,0)-(182,123),1,B
1340 '
1350 ' Put in hour marks
1360 '
1370 FOR OH = 0 TO 11
1380   MX = 120.5+58*SIN(OH*30*RD)
1390   MY = 62.5-58*COS(OH*30*RD)
1400   LINE (MX-1,MY-1)-(MX+1,MY+1),1,B
1410   NEXT OH
1420 '
1430 MX = 0
1440 MY = 0

```

(Listing continues on page 53)



# We've done it again!!!

More super software for your Model 100, Tandy 200 & NEC PC8201A!

## MEN-U-TILITY

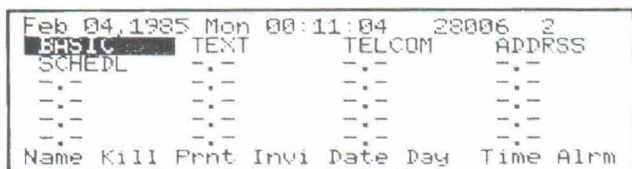
Men-u-tility is a powerful new utility for your Model 100. Once installed it is completely automatic and comes up when ever you would normally return to the main menu. As you move the cursor bar over the files, the length of each file is instantly displayed in the upper right corner. Men-u-tility adds 8 function keys to your main menu. You can kill files, rename files, make files invisible, set the day, date and time without ever leaving the menu.

Men-u-tility is also a print formatter. With F3, you can print any .DO file to your printer and you decide the right and left margins, top and bottom margins and page length! F8 sets an alarm that will go off no matter what mode you are in, BASIC, TEXT, TELCOM, etc.

If you have the Disk Video Interface (not required), the menu will appear on whatever screen you are using.

Men-u-tility only requires 1.8K of RAM and won't conflict with your other machine language programs.(100)

**\$24.95**

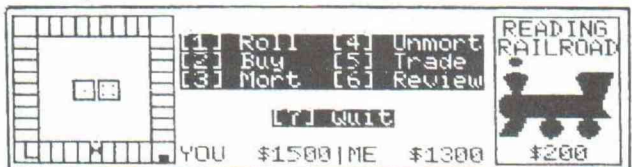


## LET'S PLAY MONOPOLY\*

It's you against the computer and the computer is a tough competitor. The computer makes all its own decisions. Super fast machine language graphics display the whole board at all times. You can tell at a glance who owns what property and the number of houses on each. It never takes more than 1 or 2 seconds for the computer to decide what to do. The computer is such a good player that you'll be lucky if you even win half of the time. (100,200,NEC)

\*Monopoly is a trademark of Parker Brothers.

**\$29.95**



## ASSEMBLER

Our assembler is the answer to your assembly language programming needs. It has all the features you expect in an assembler and more! It requires less than 3K of your valuable RAM space and is relocatable to any convenient place in memory. There are several useful macros already built in. You can output all or any portion of the assembled listing to your screen or printer. An extensive 56 page manual covers the use of the assembler, the complete 8085 instruction set, useful sample programs and LOTS of information on the ROM and reserved RAM areas. (100,200,NEC)

**\$32.95**

## Melody Maker

Melody Maker is a musical program generator. Simple cursor controls are used to select a note and position it on the staff making it easy to enter in sheet music. You can even use Melody Maker to add musical routines to your own programs. (100,200,NEC)

**\$19.95**

## BYTEFYTER

Now you can expand the memory capacity of your portable computer by reducing the size of the programs that you store in it. Bytefyter is a 100% machine language program that does just that. It is relocatable so that it won't conflict with any other machine language programs that you use now, or may use in the future.

Bytefyter works on your BASIC programs just as they are, IN PLACE. It strips unneeded spaces and remark lines. But that's not all! Bytefyter is smart! Bytefyter combines the lines of the BASIC program to whatever maximum length you specify. Each line of a BASIC program takes 5 bytes just for the line number and pointer information. By combining lines, Bytefyter saves a tremendous amount of space, space that could be used for another program or text file. Bytefyter actually checks the logic of your programs and doesn't combine lines that would cause the program to crash.

Bytefyter is amazingly fast. It will do its job on even the largest BASIC program in just seconds. You'll want to use Bytefyter on all your BASIC programs, whether you wrote them or bought them. (100,200,NEC)

**\$24.95**

## RENUMBER

Renumber is a machine language program that lets you renumber the lines of your BASIC programs IN PLACE! Renumber adjusts all references to line numbers throughout the program. It is completely relocatable so it won't conflict with your other machine language programs.

Renumber is FAST! It will renumber even the largest BASIC program in just seconds. You can renumber all or just part of a program. You decide the starting line number and the increment to use. It couldn't be any simpler. This is one utility that the serious BASIC programmer just can't afford to be without! (100,200)

**\$24.95**

## CBUG

CBUG is the ultimate debugging tool for your lap computer. It only requires 3K of your precious RAM space and is relocatable to any convenient place in memory. CBUG is not just fast, small and easy to use, it is POWERFUL! With CBUG you can step through an assembly language program or the ROM while it displays the registers, the status of the flags, and associated memory locations. You can set breakpoints and execute your code to that point. You can step through call instructions with a single keystroke and return to the point after the call. CBUG does number base conversion, hex addition and subtraction, search and display, search and replace and block moves of memory. CBUG allows you to alter the values contained in the registers, display memory and load values into memory like a monitor program. (100,200,NEC)

**\$29.95**

## SORT

Our Sort utility lets you sort any TEXT file in place. You can sort the file by any field. Sort is 100% machine language and only requires .8K of RAM. (100,200,NEC)

**\$19.95**

## CUSTOM SOFTWARE

1308 WESTERN • WELLINGTON, KS 67152

316-326-6197



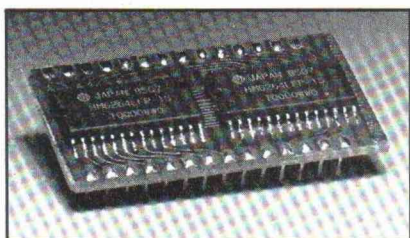
Please include \$1.00 per program for postage.  
Be sure to specify Model 100, Tandy 200 or NEC PC-8201A.  
For orders outside the U.S., include sufficient postage for airmail delivery. U.S. funds only.



**DIAL 1 (800) 732-5012 TO ORDER**

# MORE MEMORY

**FOR YOUR TANDY 200 OR MODEL 100**



**CALL FOR  
LATEST PRICE**

## **TANDY 200 24K Expansion Modules only \$99**

Expand your computer's memory in less than 5 minutes and save over \$100 on each expansion module.

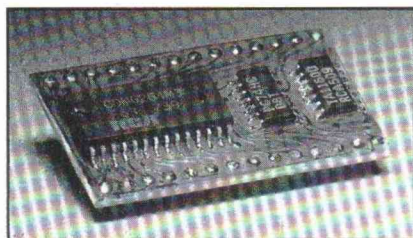
Take a dime and pop open the hatch, plug-in one or two of our 24K expansion modules, and increase your memory up to 72K.

Do you care about quality?

Whether you are writing a letter home or projecting the corporate sales—the reliability of your memory is paramount. Purple Computing's 24K modules are designed specifically for the TANDY

200 and use the highest quality components.

- Uses the lowest power and most reliable memory chips available.
- Pins are made specifically for the sockets used in the TANDY 200.



## **MODEL 100, NEC PC-8201A AND OLIVETTI M10 8K Expansion Modules \$29**

*Three for \$79 — Six for \$149*

Expand your computer's memory with our most popular product. Tens

of thousands sold. Now you can save even more. You get the same

high quality part and great service now at reduced prices.

- Easy to follow installation instructions included
- 30-day absolute satisfaction money back guarantee.
- Two-year replacement warranty.

**Tandy 200 24K  
Expansion Modules (#T200R)**

**Model 100 8K  
Expansion Modules (#M1008K)**

**PC-8201A 8K  
Expansion Modules (#NEC8K)**

**Olivetti 8K  
Expansion Modules (#OM108K)**

**FREE SHIPPING, HANDLING,  
AND INSURANCE** for Cont. USA.  
Ordered today—shipped tomorrow  
UPS. 30-day total satisfaction,  
money back guarantee. We honor  
Visa, M/C, AmExp, and Money  
Orders. Checks take three weeks  
to clear. California residents  
add 6% tax.

In a hurry?

Ask for UPS BLUE (2-day air) only  
\$4/order or UPS RED (1-day air) only  
\$12/order.

\*TANDY 200 is a trademark of TANDY CORP.

It's Easy To Order By Phone

**CALL TOLL FREE**

**(800) 732-5012**

Orders only (8am.-5pm. PST)

**(805) 987-4788**

For orders in California and for  
Customer Service

VARs, OEMs, Corporate users call  
for quantity prices.

**PURPLE  
COMPUTING**

420 Constitution Ave., Camarillo, CA 93010

Circle 49 on Reader Service Card



# A SIX-GUN BY YOUR SIDE

## 6 ROM Bank

ROM expansion device  
Portable Computer Support Group  
11035 Harry Hines Blvd  
Dallas, Texas 75229  
(214) 351-0564  
\$269  
Circle No. 141

By WOODY LISWOOD

To paraphrase, "I have met the future and the future is the 6 ROM Bank."

The 6 ROM Bank from Portable Computer Support Group (PCSG) makes the Model 100 into a truly portable management executive work station. Add another 96K RAM bank and you have 128K of on-line memory to carry with you. You can leave that damnable cassette recorder home to use for off-line storage and for loading software not yet committed to read only memory (ROM).

## LOADING HER UP

The 6 ROM Bank attaches to the Model 100 with two prongs which insert into the screw holes on the back of the Model 100. When attached, it holds the 100 at a reasonable angle for viewing.

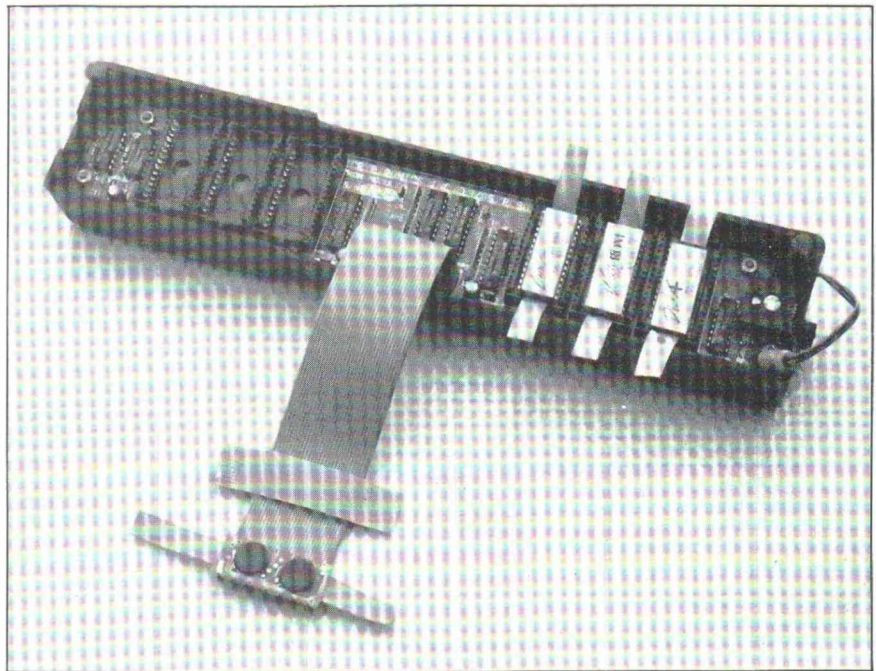
You also must connect a flat cable from the 6 ROM Bank to the ROM chip holder in the compartment on the bottom of the 100. Next you attach a small cable into the power cord plug. That's all there is.

The 6 ROM Bank contains a rechargeable battery with approximately 30 hours of normal use between charges. The actual amount of usage depends on what you're doing with your 100. Running a printer, disk drive or both will take more juice than doing simple text editing. It uses the same charger which comes with your Model 100 so you won't have to spend money on one you don't need.

## PRETTY STRAIGHT SHOOTER

The 6 ROM Bank, in addition to the 6 ROM-chip holders and rechargeable battery, has a small rotary switch on the right side which allows you to select which ROM chip you wish to use.

Here is how I set up my system.



*Portable Computer Support Group's 6 ROM Bank let's you access six different option ROMs, individually, with a minimum of effort.*

First I put in the 128K RAM Bank from PCSG. I put RAM Plus which accompanied the RAM Bank into chip holder number 1. That means there's now active ROM-based software to manage all four banks of information. If you read my comparison review between PG Design and PCSG RAM banks, my main reason for liking the PG Design setup is that it came with cassette based software to manage the RAM banks, while the PCSG would only load software to switch between banks when the RAM Plus chip was taken out. Now, with RAM Plus in holder number 1, I needn't waste any of my precious memory to hold memory management software.

I placed Lucid in chip holder number 2. Now, I'm keeping all my working spreadsheets in Bank 2. Since I have a total of four separate 32K RAM banks available for use, I keep each of my favorite programs in separate areas. This makes for less confusion when I want to work on something and need to find it immediately.

For example, say I'm currently in

Bank 4 using my text processing program, Write ROM. I finish writing a report and want to go over to Bank 2 to continue development work on a spreadsheet. I exit Write ROM and turn off the machine. Then I turn the rotary switch to ROM-bank 2 and flip the 100 back on. While in RAM-bank 1, I enter BASIC and type CALL 63012,1 which activates RAM Plus. By pressing F3, I can put a "GOTO Bank #" program into each memory bank. Now I can move the cursor to GOTO2.CA, enter BASIC and key my CALL numbers to bring up my spreadsheet.

If, when I was in Write ROM, I'd already left the GOTO program in each bank, the process would be even easier. Either way, it is not much work for such convenience.

In chip holder number 3, I keep a Disk Plus ROM. If you have an older version of Disk Plus, you should consider getting the latest version. In addition to all the normal goodies about using your disk-based microcomputer as a storage media, you can now convert a Lucid



spreadsheet to a VisiCalc format, which can then be loaded directly into other spreadsheets such as Lotus 1-2-3 and Multiplan.

## MOVING SPREADSHEETS

If I now wanted to activate DISK Plus to move the spreadsheets up to my Compaq, I turn off the 100, move the rotary switch to chip number 3 and turn the machine back on. Then I place the cursor over GOTO2.CA in the main menu to return to Bank 2. Next I place the cursor over Lucid, press Return and DISK Plus is now active. When I exit DISK Plus, I'll find it in the main memory menu in place of Lucid.

Yes the Model 100 now, in addition to being a really neat working machine, has become an ideal development machine. Since I travel constantly, I can work on client's spreadsheets while on a plane. Then when I arrive home, plug in my Smartcable between my Compaq and portable, switch to Bank 2, activate DISK Plus, transfer up the Lucid spreadsheet, go to the Compaq, convert that spreadsheet to a VisiCalc format, boot 1-2-3, read it in and then continue to work with or expand the spreadsheet to my heart's content. Too bad it doesn't work in reverse.

I also tested the 6 ROM Bank with Traveling Software's Ultimate ROM, and found that it worked fine. So if you already own it and wish to use it with DISK Plus and the other PCSG programs, you'll have no problem.

Perhaps you noticed that I did not mention documentation. It is the typical complete yet chatty type of documentation produced by PCSG for all of its products. However, in this case it is not necessary to completely understand it to use 6 ROM Bank. There are only two rules you must remember to make things work out and to avoid erasing memory banks when changing chips.

First, always return to the Model 100 main menu *before* you do anything. Do not change the rotary switch to address a new chip when you are in any type of program whatsoever.

And second, turn off the Model 100 before you move the rotary switch to select your new chip.

The second step is not always necessary. But I'd recommend it, rather than to try to remember which programs you can and cannot switch out of, and which chips are where and why.

I can say that you do not need the documentation from experience. I tested unit number 2 and have had absolutely no problems with it. That says a lot to

me, since in using and beta testing much hardware and software over the years, I'd expect that number 2 off a "production line" would normally fry a chip or two and I'd need to get to number 1,000 or so before everything worked with no problems, and as advertised.

I only had one problem with the 6 ROM Bank. I couldn't remember which ROM chip I had in which number chip holder. The accepted practice was to lift it up and see what color of ribbon is sticking out the top side of the 6 ROM Bank. I found out that PCSG color codes the ribbon attached to each of its chips. For example, Lucid is blue, Write ROM is pink, RAM Plus is gray and Disk Plus is dark green. Well, I immediately looked and discovered that my Disk Plus chip had a plaid ribbon. That's the trouble with working with early versions prior to standardization, not to mention using other chips that aren't color coded.

Anyway what I finally did is just list the ROMs in order, by position, in pencil across the front of my Model 100. If you were to see my Model 100, you'd find all sorts of pokes, calls and small one line programs written there. Now I have my semi-permanent 6 ROM Bank menu reminder there also.

Try as I might, I couldn't come up with any other problems. Perhaps PCSG could figure some way to switch banks and chips by reading my mind? □



## Cassette Help

### T-backup. Version 2.3

Cassette storage/recovery program  
for Model 100, NEC PC-8201  
and Olivetti M10

Traveling Software, Inc.  
11050 Fifth Avenue NE  
Seattle, WA 98125  
(206) 367-8090  
\$19.95

Circle No. 145

By J. R. WILSON

In the beginning there was the cassette and the way it worked made Model 100 users scream. Next came the Tandy Disk/Video Interface (DVI) — and more screams. Finally some relief

with Chipmunk and PIC's portable disk drive.

However, the cassette remained the only truly portable "permanent" storage device for these new highly portable computers. Improved hardware, such as Tandy's paperback-sized CCR-82 cassette recorder, made life easier, but still not perfect. Far from perfect.

Most cassette users followed the pattern established by software companies, loading each file onto tape at least three times. The reasoning was that the first attempt almost never took, the second frequently failed and "third time's the charm."

Unfortunately, the only way to be certain of all this is to reload the file, which is time consuming and sometimes impossible if you're pushing the limits of your random access memory (RAM).

Now, Traveling Software has made the first serious effort to do something about the first — and almost certainly still most prevalent — mass storage device for portables. T-backup is a cassette storage/recovery program that copies everything in a memory bank to tape. It's fast, taking only three and a half minutes to dump an entire 32K of RAM. Data can be recovered in the same amount of time.

So what?

Alright. It also *verifies* the dump, directly comparing what's in RAM with what was stored on tape — again in three and a half minutes — and tells you if it worked or not.

You want more?

More you get. When storing files, T-backup asks you to give the backup file a six-character name, to distinguish it from other saves you make. Then you're given another 28 spaces for any other comments you desire (perhaps a short-hand listing of all the files you're storing).

When you verify a save, you identify the backup file you want verified by the six-character name. T-backup searches the tape for that name, then displays the file information: name, size of memory bank stored (based on the maximum RAM installed in your computer when the files were stored), date, time and the descriptive comment you wrote at the time.

To restore, you also respond with the file name and, once located, the file's descriptive information is displayed. If you've given several files the same name, you can page through them by answering "no" to the "Begin Y/N" prompt and running T-backup's restore mode again. When you do order it to begin, the



# USE YOUR DESKTOP COMPUTER AS A DISK DRIVE FOR YOUR M-100.

*New-  
IBM, MS-DOS  
version works  
over the phone!*

# Disk+

on Snap-In™ ROM

NOW  
AVAILABLE  
ON  
M-200

## Try Disk+ for 30 days. If you aren't as excited as we are, return it for a full refund.

When we designed *Disk+* we did it out of necessity. We wanted a way that we could just connect a Model 100 to our desktop computer with a cable and save files onto the desktop's disk drive. We wanted it to be so simple to use it would be self-explanatory.

Picture this. *Disk+* comes to you on a Snap-in ROM and a diskette for your desktop. You take a quarter and open the little compartment on the back of your Model 100. Then you just press the ROM into the socket. *Disk+* appears on your main menu just like a built-in.

You connect your Model 100 to your other computer using an RS232 cable (available from PCSG for \$40).

You just place the *Disk+* diskette into the desktop's drive and turn on the computer. It powers up automatically and says "awaiting command" on your desktop's screen. Then you just put the widebar cursor on the Model 100 main menu on *Disk+* and press ENTER. You are shown your RAM files arranged just like the main menu.

To save a file to your other system's disk drive, you just move the widebar cursor to the file you want to save and press ENTER. It is saved instantly with no further action.

To look at the disk directory, you just press a function key on your Model 100. You see immediately the disk directory on your Model 100 screen, and it is arranged just like your Model 100's main menu.

To load a file from the diskette to your Model 100, you just move the widebar cursor to the file and press ENTER. The file is transferred to your Model 100's RAM instantly. You can press F8 and go back to the main menu, and the file you loaded from diskette is there, ready to use.

It is so nice to be able to keep your documents, programs (both BASIC and machine code) and *Lucid* spreadsheet files on the diskette, and bring them back when you need them. All files are ready to run or use with no changes or protocol by you.

**If you have access to a desktop computer and don't have *Disk+*, then evidently we have done a poor job telling you about it.**

All files and programs that you load or save, go over and come back exactly as they are supposed to be because of full error checking. This guaranteed integrity is really a comfort. *Disk+* is wonderful in so many other ways. For example, you can do a "save all" of all your RAM files with just a touch of a function key. That group of files is saved on the diskette under a single filename with a .SD (for subdirectory) extension. Any time you want, you can bring back all those files at once, or just one or two if you like, again with one-button ease.

*Disk+* takes up no RAM. That's zero bytes either for storing the program or for operating overhead.

What really excites most *Disk+* users is text file cross compatibility. Your Model 100's text files are usable on your desktop computer, and your desktop's text files become Model 100 text files.

This means you can write something on your Model 100, and with *Disk+* transfer it

instantly to your desktop and start using it right away on your bigger computer. Or the way we like to work is to type in a document on the desktop computer and then transfer it to our Model 100 with *Disk+*. Then we print out the document, beautifully formatted, using WRITE ROM.

*Disk+* works with just about every micro sold, from IBM PC and its clones, to all Radio Shack computers (yes, all), to Apple II, Kaypro, Epson and most CPM. Just ask us. More than likely, your computer is supported.

Incidentally, hundreds of Model 100 owners have gone to their Radio Shack stores and bought a color computer because it is so low priced, and with *Disk+* they have an inexpensive disk drive.

And if that weren't enough, how about this: *Disk+* also provides cross-compatibility between different computers like IBM, Apple or the Model 4 using the Model 100 as the intermediary device. Quite a feature!

The snap-in ROM is really great because you can use other ROMs like *Lucid* or WRITE ROM. They snap in and out as easily as an Atari game cartridge and you never lose your files in RAM.

Anyone who ever uses *Disk+* simply can't do without it. But so many times we have had new users call us and say, "Wow! I had no idea when I ordered it that *Disk+* would be so fantastic. I just couldn't believe that I could use my desktop computer's disk drive with my Model 100 just like it is another main menu."

That's why we sell *Disk+* on a thirty-day trial. If you aren't completely satisfied, return it within thirty days for a full refund. Priced at \$149.95 on Snap-in ROM. MasterCard, Visa or COD.

## 1-214-351-0564

## PORTABLE COMPUTER SUPPORT GROUP

11035 Harry Hines Blvd., #207, Dallas, Texas 75229 • 1(214) 351-0564

PCSG provides hotline software support for the Model 100. Call us at 1-214-351-0564

Circle 36 on Reader Service Card

© PCSG 1985



backup file will be reloaded in — you guessed it — three and a half minutes.

If the transfer is good, the program displays: TRANSFER OK PRESS SPACE. If not, you get: TRANSFER BAD! PRESS SPACE. The latter can be caused by a number of factors, including improper equipment connections, tone or volume problems, a bad tape, or even a mismatched recorder.

Speaking of the latter, my experience while preparing this review leads me to urge strongly that you use the same recorder both coming and going. For that matter, the most reliable recorder I've used, both with T-backup and the old fashioned way, is the CCR-82, which is beautifully designed with the user in mind.

T-backup is simplicity itself to use. You need load only one file from, naturally enough, a cassette (the traditional Traveling Software audio tutorial is on the flip side) and the excellent documentation guides you through its few operating points. If that doesn't work, the function-key driven screens tell you exactly what to do — including a little reminder to verify each backup.

This is not to say all is perfection, of course. For instance, you can run into problems if you're using certain RAM expansion modules. Also, there have been reports on CompuServe's Model 100 SIG of recorders continuing to run after the program should have finished, and other lesser problems.

I didn't encounter any of these, but I did have a real scare when I tried to reload files saved from one memory bank into another. Basically, it didn't work.

The reason, however, makes sense. Say you dump the contents of bank two to tape, then later try to reload them into bank one. The bank-switching .CO files which downloaded bank two with the rest of RAM are not the same as the ones used in bank one. The result is chaos in .CO city and real problems for the would-be user. That is why I simply name my T-backup files Bank1, Bank2 and Bank3. Then I make certain that's where I put them when it comes time to reload.

T-backup is a good companion for the lap portables. It speeds up cassette storage/recovery, gives the user greater confidence in the medium and offers a nice identification system that enables you to create a library of backups.

And at \$19.95, it's a bargain!

So, even with these few minor faults, T-backup rates 3.5 stars on a 4-star scale. □

## Model 100 Fix All

### Assembler/Debugger

Debug, write, and assemble machine language code.

Tandy/Radio Shack

Fort Worth, Texas

\$49.95

Circle No. 142

By RONALD F. BALONIS

**O**n the basis of the short description in the Radio Shack Catalog, you'd think this was just another ordinary assembler and debugger. The description, however, is deceiving. This is definitely not an ordinary one; it's a veritable programmer's toolbox. If you write, or want to write, machine language programs for a Model 100, this assembler and debugger, along with perseverance and persistence, is all you need to do it.

I've been waiting for this one. Machine language makes the bytes go farther and faster, and with a little computer like the Model 100, it also makes it bigger.

### PACKED FULL OF FEATURES

The Model 100's 80C85 processor is a first cousin to the ubiquitous 8080 microprocessor of the early days of computing. Its instructions are a subset of the Z80. That makes machine language programming on the Model 100 easier for both novice or expert. There's a decade of published software, technique and practice to learn from. And, the Model 100's ROM's routines are well documented too, just waiting to be used.

The Assembler/Debugger's manual really impressed me. The manual follows the same writing style as the Model 100's; it's clear, concise and leads you through the Assembler/Debugger with a sequence of examples that explain the commands and show what they do. Step by step, it takes you from the initial loading of the Assembler/Debugger program, ZBGASM, through an assembly example program which fills the screen with a graphic character. Then through ZBUG's commands by debugging the example program. And on to examples that demonstrate its programmer's calculator mode: +, -, /, \*, MOD, and Logical.

Then it documents and tells how to use some of the read-only memory (ROM) routines. Finally, in its last sec-

tion, the manual documents and describes the 8085 op code commands using Intel mnemonics.

The Assembler/Debugger is written by Microsoft and its style is a blend of the first machine language tools, EDTASM and TBUG, that Radio Shacks grew up on. The source file format is the same: tab between the fields — label, opcode and operand. Use a semicolon to precede remark documentation. The assembler supports, essentially, the same functions as EDTASM except that the mnemonics are Intel's instead of Zilog's.

The assembler's source files are written with the 100's text editor. The source file for assembly can be either a cassette or random access memory (RAM) file, and the object code can be assembled directly to memory or as a file to cassette or RAM. The assembler is machine language quick: assembly of the (30 byte) example program, without listings, took just one second. With listings it assembled at the speed of the listing device, about five seconds for the LCD and 30 seconds for the printer.

It is the debugger, ZBUG, that differentiates this assembler and debugger from the ordinary. ZBUG does all the usual debugging things: examines and changes memory, sets and removes break points, examines registers, moves memory, loads and saves to cassette or RAM.

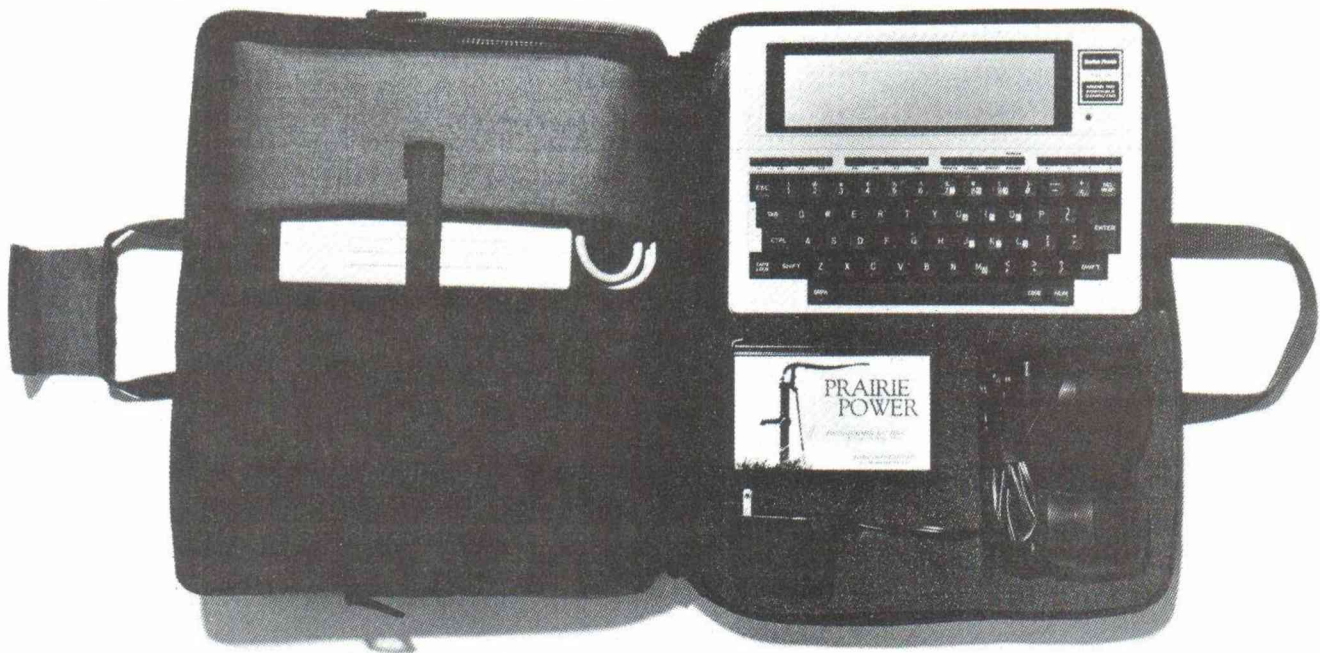
But, ZBUG also works in any of three number bases input or output: decimal, octal or hex. It also displays memory in byte, word, ASCII or mnemonic chunks. In the mnemonic mode, it functions as a disassembler. And, when a machine language program is assembled directly to memory, you can debug it using either the usual memory address mode or the symbolic label mode. It means that, with ZBUG, you can debug using the symbols of your program.

As with all Microsoft programs, the Assembler/Debugger is user friendly. An extensive list of error-prompts guides your use and programming efforts. The error-prompts in combination with the unique commands make debugging machine language almost as easy as BASIC.

There's another feature, the one I like most, that sets it apart from the ordinary debugger. It has a command to select its console device: LCD, LPT, or COM. COM is the RS-232 port. By making COM the console device and using the T (type out) command, it sends an ASCII listing of a range of memory out the port. The ASCII listing file can then be edited into a source file. It saves a lot



# The Ultimate Battery System for your Portable Computer



**Prairie Power™** introduces a brand new battery, charger and carrying case that greatly extends the power and efficiency for lap-top computers such as the Tandy 100 & 200, NEC 8201, 8401, Apple IIc, Epson and Sord.

The heart of the **Prairie Power** system is the lightweight rechargeable battery pack that can, for example, power the Tandy 200 up to 160 hours. By comparison, its "AA's" last a mere 10-15 hours. By the time a Tandy 100 has used up 10 packs of "AA's" **Prairie Power** is ready for its first charge (180 hrs.) Our new battery system can even power the Apple IIc for 8 hours and contains a sophisticated circuit to warn when the battery is low.

## A Compact System!

The **Prairie Power** system fits under any airline seat and measures only (17x13x5"). With Tandy 100, battery, case and charger, weight is only 12 lbs. Apple IIc system weighs 20 lbs. Battery is fully rechargeable, sealed, maintenance free, useable in any position and air transportable. Never again worry over shelf-worn "AA's"



The new two--step charger simplifies recharging by showing when the battery is charged and then switches to standby. You always know the battery is charged and ready-to-go, whether for emergencies or long trips on the road. Besides the assuredness and efficiency of a powerful battery system, **Prairie Power** will pay for itself over the cost of "AA's".

Best of all, the battery system and computer are housed in a handsome water-resistant padded Cordura case protected by support panels and thick foam inserts that hold computer, battery, charger, cables and accessories. A padded pocket can also hold a flat-panel screen, small recorder or 3.5 "drive and manuals. **Call our toll-free number today!**



**PRAIRIE  
POWER**  
SYSTEMS, INC.

Prairie Power Systems, Inc.  
768 Twelve Oaks Center  
15500 Wayzata Blvd.  
Wayzata, MN 612-475-1945

Model 10 Battery (\$59.95) Cable (\$19.95)  
Two-Step Charger (\$55.95) Cordura Case (\$99.95)  
M /C, Visa, Check, MO \$US only.

**Total System Price \$169.95\***  
**Toll-free 1-800-435-8721**

\*Apple 12-volt system (\$249.95) Freight extra (\$6.00)



## REVIEWS

of programming time and effort, and gives you the ability to make source files of the machine code routines in your 100.

That's it, for the real good things about it. Now, for the two things that might not be so good because they require some effort on your part.

### OF COURSE THERE'S A CATCH

The first is memory. ZBGASM is 8,203 bytes long and needs 5,121 bytes of running room in RAM. This means

that if ZBGASM is saved as a RAM file, you need a 32K Model 100 to use the Assembler/Debugger. However, all is not lost. If you just load it from cassette and run it, a 24K machine will do. Basically, to use the Assembler/Debugger you've got to develop good memory management practices. A good idea anyway, because the fatal error is a fact of machine language life. When you're assembling, the machine should only contain the files and programs you need.

The second is mnemonics. ZBGASM

recognizes the original Intel mnemonics, not the Zilog ones that Radio Shack-ers grew up on. Of course, becoming bilingual isn't so bad. If you're going to be able to use the machine language technique created for the Z80 or 8080, you'll have to be.

Overall, the Assembler/Debugger contains almost all the tools you need to write machine language programs for the Model 100. All that's missing are the algorithms and the technique. But, fortunately, they're available too. They come with time and practice.

The Radio Shack Assembler/Debugger for the Model 100. I like it, this one's going to work for me. □

# Axonix PACKS

## PERFORMANCE IN YOUR PORTABLE

### ThinPack™ Battery/A.C. Powered Peripherals include:

#### PRINTERS

- ThinWrite: Dot matrix impact — 40 and 80 column models
- ThinPrint: Thermal dot matrix — 40 and 80 column models
- ThinType: Impact letter quality — 80 column model

#### DISPLAY SYSTEMS

- ThinView: 80 x 25 LCD intelligent display terminal
- ThinE/L: Electroluminescent backlight for Model 100
- ThinVid: Video interface for Model 100/200

#### MASS STORAGE

- ThinDisk: 3½" drive — compact, battery-powered
- ThinStore: Microcassette data and oral dictation storage

#### INTERFACES

- ThinI/L: HP (82166A) HP-IL parallel interface converter
- ThinMac: Macintosh to parallel printer interface
- ThinCom: Serial interface for Async, Bisync, SDLC, Protocols

#### ACCESSORIES

- ThinChargers: Automobile and foreign current adapters
- ThinPower: Add-on rechargeable battery packs (solar optional)

#### SYSTEM INTEGRATION SERVICES

Axonix provides custom design and packaging services for application specific requirements

FOR MORE INFORMATION, CALL  
(800) 821-7093 or (801) 582-9271

# Axonix

The Portable Peripherals People  
417 Wakara Way  
Salt Lake City, Utah 84108

## More For Less

### DO4MAT

BKInc  
P.O. Box 218  
College Park, MD 20740  
(301) 345-9473  
\$39.95  
Circle No. 147

By PAUL J. PERRY

Model 100 owners who've been limping along using the built in text printing facilities might pounce on DO4MAT as one of the first low cost, powerful text formatters available. But saying that it's low cost and has great features does not do it justice.

### OH NO, NOT ANOTHER ONE

This may be exactly what you are thinking right now. But companies selling text formatters today are serious about it. Most of the "fly by night" software outfits are all working on programs for the Amiga computer. They've abandoned the portable market.

DO4MAT sold by BKInc has some wonderful features and a great low price in the bargain. Be forewarned though, it is not simple to use. DO4MAT has advanced features not available with other cassette-based text formatting programs. The more experienced you are, the better off you'll be.

The Model 100 is used mainly for word processing by most of its owners. Yet it's a well known fact that the Model 100's text printing abilities are limited, to say the least. A lot of text formatters have been developed to right this wrong. Some have hit the mark, many have fallen far short. DO4MAT fills an important gap.



This program comes on cassette tape and requires that you first load a program called INIT.BA. This readies your computer to load and execute the program. Once it's been done you can load DO4MAT anytime.

Unlike other text formatting programs, there's no worry about loading machine language code. I had no problems loading the program. If you have trouble, however, try using the BASIC Soundoff command. The Model 100 performs more reliably when this command is in effect.

DO4MAT, like other text formatters, allows you to set right, left, top and bottom margins. Variable line spacing, centering and justified right margins are all permitted as well. But this is where the similarities with other programs stop.

## ADVANCED FEATURES

DO4MAT uses "dot commands" which are included in the text of the input file to produce formatted output. Also called embedded commands, dot commands are instructions to DO4MAT for formatting your document. For example, .ce turns text-centering on. These are the same type of commands which powerful word processors like Wordstar use. Your documents are created with the TEXT processor, and the dot commands are inserted into the file using TEXT.

The manual says "The design goal for DO4MAT is to provide a powerful and comprehensive set of commands that allows the cassette based Model 100 system to be useful for reasonably sophisticated document applications." This is true, but it takes some reading and rereading to learn how to use all the features.

The program includes the ability to use headers and footers. The header can include the date, time and page number. It supports cut sheet mode where the program will wait after each page is printed for you to put a new piece of paper into your printer. Conditional skipping of text is also supported.

A special feature of DO4MAT is that it includes a special file called PRT-CAP.DO which specifies special printer codes for your printer. Just specify what type of printer you own while ordering the program. If BKI does not support your printer, instructions are included to show you how to create your own customized file. This lets you embed easy to use dot commands to allow use of special features within your printer — like underlining, italics, bold print, subscripts and superscripts. You can also easily

change the width of your printed text by using a dot command.

An exciting capability is a keystroke reduction feature which lets you assign a word or string to a single character. An example would be while writing this review I could define E to mean DO4MAT. Then whenever I want to use "DO4MAT" in my review all I have to do is type E.

DO4MAT provides a comprehensive set of tab specifications which allow a high degree of control over the format-

ting of tables and columns. Up to ten tab positions may be specified. Each position may individually specified to be left justified, right justified, centered, or aligned on a specified character. Also the intervening space between the text that was entered prior to depressing the Tab key and the text that is positioned according to the tab specification is filled with the tab fill character. The default tab fill character is the blank. The tab fill character may be changed to  
(continued on page 51)

Circle 61 on Reader Service Card

## STOP BUYING BATTERIES!!

**COMPU-CHARGER™** powers or charges the batteries in your portable computer while you drive.

Plugs into car cigarette lighter.

For Model 100/200, NEC-8201, OLIVETTI M-10.

Includes 4 AA Nicad batteries.

\$29.95 postpaid

## COMPU-CHARGER

25171 Costeau

Laguna Hills, CA 92653

(714) 859-8286

## TEXT »COMPRESSION« ADDS MEMORY

with Lap Coder©

A NEW PROGRAM

FOR MODEL 100, 200, NEC 8201

- Store up to 50% more text — Without adding RAM!\*
- Cut cassette save-load and modem time by 1/3\*
- Machine language — Codes 3400 characters/second
- Only 510 bytes long — Relocatable in memory
- Not "Vaporware" — Immediate delivery

Lap Coder replaces words in your text files with a tightly packed code. Simply move the cursor over the name of the file to be compressed or expanded and press return. No typing or commands needed!

\*While the amount of compression varies, and not all text is compressed, our tests on newspapers and novels showed that 46-53% more text could be stored in the same memory space using LAP CODER! Up to 42K per full bank (M100, NEC).

Only **\$20** plus \$2.00 shipping & handling

Check, Money Order, Visa, MasterCard accepted  
(Include card number and expiration date)

California residents add \$1.20 sales tax. Specify Model 100, 200 or NEC

## Mu-Psi Computer Consulting

1010 Turquoise St. #250, San Diego, California 92109 619/488-2350

Circle 43 on Reader Service Card



# Bugs and Secret Features of Model 100 BASIC

Minor details that Tandy neglected to tell us about our favorite programming language.

By Gary F. Simons

**T**he documentation on BASIC in the Model 100 owner's manual leaves something to be desired. Missing information and even misinformation are prevalent. And the software isn't without blemish either.

In developing text processing software, I've discovered a number of bugs and undocumented features in Model 100 BASIC's file and string handling capabilities. These are described below. The accompanying table summarizes the problems found in the implementation or documentation of 25 BASIC keywords.

## SOFTWARE BUGS

`RUN,R` (page 176) is supposed to run a program without closing the files currently open. Instead it gives a ?SN (syntax) error and does nothing.

`TAB(n)` skips to column `n+1` before printing the next item in a `PRINT` statement. Although the argument may range from 0 to 255, when the total length of the line to be output approaches or exceeds 255, `TAB` comes up short. For instance, open a test file in random access memory (RAM) for output as file 1, then execute the following:

```
PRINT #1, TAB(250); "1234"  
PRINT #1, TAB(250); "12345"  
PRINT #1, TAB(250); "1234567"
```

We expect lines of successively increasing length. Instead, the result is three lines, each 254 characters long. The second `TAB` gives 249 spaces and the third only 248. The statement `PRINT #1, TAB(250); "1234567"` produces a line of length 255 (thus a `TAB` of 248).

When `PRINT` has no expression list, it produces a blank line on the screen.

Similarly, `PRINT #1` by itself should produce a blank line in file 1. Instead it gives a ?SN (syntax) error and halts program execution. To achieve the desired result it is necessary to say `PRINT #1, ""`.

The `LINE INPUT #` command in direct mode gives a ?SN (syntax) error. The message turns out to be a bogus one

and the requested input operation is in fact performed. Oddly enough, the error message is not given if the length of the input string is 2 or less.

The function `INPUT$(n,f)` reads `n` characters from file `f`. When such an input operation detects end of file, the operation aborts altogether and any character

(continued on page 47)





A white Radio Shack Model 100 portable computer is shown at an angle. It has a monochrome screen displaying some text, a full QWERTY keyboard, and various function keys. A small label on the top right of the device reads "Radio Shack", "T100-100", and "MODEL 100 PORTABLE COMPUTER". To the right of the computer are two Christmas ornaments, one red and one blue. The background is dark with out-of-focus lights.

**\$100**  
*Christmas Savings!*

The popular 24K Model 100 portable computer...  
a ready-to-use gift sensation for only \$499.

To help you with your gift-giving decisions we are offering special savings of \$100 on the most talked-about, most-wanted portable computer—the Radio Shack Model 100. It is one present that can be used by anyone! Give one to the student headed for college, to self-employed family members who need an “assistant” to get ahead, and to the movers and shakers at your office who are constantly on the go.

Just turn on the 24K Model 100 and it's ready to go to work anywhere, anytime. Five built-in personal management programs make the Model 100 a word processor, an electronic file for notes, addresses and telephone numbers, a telephone auto-dialer and appointment scheduler. You can write your own programs in BASIC, or add ready-to-run software from our library of cassette, disk and ROM programs. With the built-in

direct-connect modem, national information services can be easily accessed by telephone. Add a printer, cassette recorder, disk drives and a monitor for expanded versatility.

Surprise someone special with a Model 100 (26-3802, Reg. \$599). Or give a Tandy 200 (26-3860, Reg. \$999) for only \$799 and save \$200.

**Radio Shack®**  
**The Technology Store™**  
A DIVISION OF TANDY CORPORATION

Sale ends Dec. 24, 1985. Prices apply at Radio Shack Computer Centers and at participating Radio Shack stores and dealers.

Circle 54 on Reader Service Card







# Navigating On Your 100

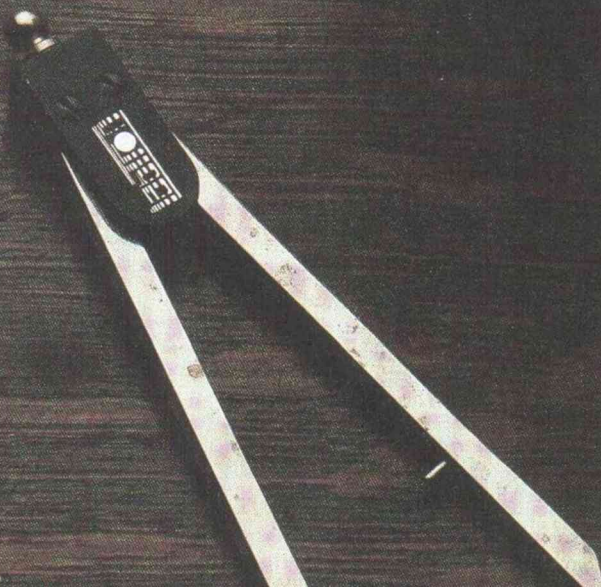
By R. D. Boudinot

*The art of navigation is one of the great and romantic accomplishments of our civilization. Navigators use the same techniques as Magellan, Sir Francis Drake and Captain Cook.*

*It comes down to fixing location, and determining bearing and distance, whether in boat, plane or your car.*

*The principles of navigation were developed over the centuries. The tools used by sailors included the octant, the taffrail log and later the chronometer.*

*The calculations that were the bane of many an ancient mariner are much easier for your Model 100. A simple program makes you the master navigator, or at least bearing finder. (cont. on p. 56)*





**Any other  
multiple ROM  
is just  
a toy**

*Try SUPER ROM for 30 days.  
If you don't agree,  
return it.*



# **SUPER ROM** **Lucid Spreadsheet Write ROM Database Outliner**



NOW  
AVAILABLE  
ON  
M-200

## **NOW YOU CAN REALLY HAVE IT ALL!**

**All on one ROM. Truly the finest four programs  
available for the Model 100 — guaranteed.  
Try it for 30 days. If you aren't blown away by the  
excellence return it for a full refund.**

# **\$199<sup>95</sup>**

The four best programs for the Model 100 all on one ROM. 32K of power without using any RAM for program storage. This is the PCSG Snap-In ROM that just presses easily into the little ROM socket in the compartment on the back. You access the four right from the main menu like built-ins.

Write ROM — the definitive word processor for the Model 100. Function key formatting or dot commands. Search and replace. Library feature — inserts words, phrases or whole documents into text from just a code. MAP lets you see a picture of your document. In all there are 60 features and functions. No one can claim faster operation. FORM lets you create interactive forms with on-screen prompts that you can answer from the keyboard. Nothing else for the Model 100 compares with the features of Write ROM. Exactly the same as the Write ROM sold as a single program. Infoworld says it "makes the Model 100 a viable writing unit ... sur-

passed our highest expectations for quality and clarity."

Lucid Spreadsheet: This is the one PICO magazine says "blows Multiplan right out of the socket" and Infoworld performance rated as "excellent" and said "makes the Model 100 compute." Gives you features you cannot get with Lotus 123. Lets you build spreadsheets in your Model 100 that would consume 140-150K on a desktop. Program generating capability with no programming knowledge required. Variable column widths. Includes find and sort with function key control. It's fast, recalculates like lightning. No feature has been taken from the original, only new ones added.

Database: This is a relational data base like no other. You can do everything from mailing lists to invoices. No complicated pseudo-coding, you create input screens as simply as typing into TEXT. You are not limited by size; you can have as large an input screen as you wish. Prints out reports or forms, getting information from as many files as

you like. Complete math between fields. Total interface with Lucid worksheets.

Outliner: Does everything that Think-tank does on a PC but a whole lot better. Includes a Sort for your headlines. Lets you have headlines of up to 240 characters. Has cloning, hoisting and sideways scroll up to 250 characters. Like Lucid, this one sets a new standard for outliners. This is the way to plan and organize your projects.

Present Lucid and Write ROM owners can upgrade for \$100. If you have both it's \$75.

As usual PCSG sells the Super ROM on a thirty day guarantee. If for any reason you are not satisfied, simply return it for a full refund.

We are excited about this product. Super ROM gives the Model 100 the true power of a desktop. No other multi-program ROM has software that compares. But don't take our word for it. We invite you to make that comparison yourself. Priced at \$199.95 on Snap-In ROM.

*Got stuck with somebody else's multi-ROM?  
We'll upgrade it for \$100.*

## **(214) 351-0564**

# **PORTABLE COMPUTER SUPPORT GROUP**

11035 Harry Hines Blvd., #206, Dallas, TX 75229

© PCSG

MC, Visa, American Express, Check, or C.O.D.

Circle 41 on Reader Service Card









# Holiday Mixings

BY FRED W. FORRESTER

**E**ggnog. It's a traditional holiday drink made with milk and beaten eggs. Through the years, changes to the recipe have reduced the art of making eggnog from measuring exact proportions of milk and beating eggs just right to fighting lines at the local supermarket for premade "nog" and visits to personal liquor cabinets.

Despite less fanfare, some eggnoggers haven't lost their creativity — as Fred Forrester of Santa Barbara, California proves.

"We usually have a large eggnog party at year's end," he writes. "Since they vary in size, it's necessary to compute amounts of ingredients. This program helps you do that.

"A six ounce cup has been used as a basic serving. It's about right for a drink of this type. I'd suggest assuming three drinks per person for a large party. It's a good average."

And so we offer this progr. . . uh, recipe to you, our readers with every good wish for a happy holiday season and prosperous New Year. Cheers.

(Listing begins on page 52)





**\$200**  
*Christmas Savings!*

## Give them the full power of our advanced Tandy 200 portable computer for only \$799.

The Tandy 200 is a breed apart from other portables. Just turn it on and get power that's equal to some desktop computers. Indeed, the Tandy 200 is the only portable computer which comes complete with six built-in applications, including Multiplan (which is an extra-cost item on desktop computers).

### **More than a status symbol**

The Tandy 200 is a working on-the-go computer. It's a favorite of journalists and students because of its built-in word processor. Take

notes or write reports then transmit the files by phone to the office or attach a printer for a paper copy. You can also use the Tandy 200 as a personal appointment calendar, address and phone directory and telephone auto-dialer. The 16-line by 40-character flip-up display features over-sized characters for superb readability.

With the Tandy 200's built-in direct-connect modem, information services and other computers can be easily accessed by telephone. A

printer, cassette recorder, disk drives, monitor and ready-to-run software can be added at any time.

### **Sale ends Dec. 24**

Surprise someone special with a Tandy 200 (26-3860, Reg. \$999). Or save \$100 and give our famous Model 100 portable (26-3802, Reg. \$599) for only \$499.

**Radio Shack®**  
**The Technology Store™**  
A DIVISION OF TANDY CORPORATION

Sale ends 12/24/85. Special orders required at some locations. Prices apply at Computer Centers and at participating Radio Shack stores and dealers. Multiplan/TM Microsoft Corp.

Circle 56 on Reader Service Card



acters read thus far are lost. For instance, if the statement `A$=INPUT$(5,1)` reads 3 characters and then hits end of file, the operation aborts with an `?EF` (end of file) error and the last 3 characters of the file are thrown away. The value of `A$` remains what it was before the attempted `INPUT$` operation. File 1 is set to the end of file and any subsequent attempts to read from it give end of file. There is no way to get back the unknown final characters of the file.

The implementers of Model 100 BASIC may regard this to be an undocumented feature of the language rather than a bug. If so, it was a poor design decision. Anything that loses valid data sounds like a bug. A reasonable implementation would be to set the target string (`A$` in the example above) to the characters input thus far, and then signal end of file. Under the present implementation, the `INPUT$(n,f)` function can be safely used for file input only when `n` equals 1, in which case the parameterization of `n` is not a very useful feature.

## DOCUMENTATION BUGS

There are a number of points at which the implementation behaves correctly as one would expect BASIC to behave, but the manual's description is incorrect. At a superficial level there are typographical errors, like the failure to indicate the closing quote in the example for `DAY$` on page 135, or the description of `DEFSTR` (Define String Variables) on page 136 which says that the example "defines as integer type all variables" listed. This is clearly a word processing mistake in which the explanation for `DEFINT` was copied but not sufficiently edited. Other documentation bugs go deeper than these.

The documentation for `TAB(n)` says that "TAB skips `n` spaces before printing the next data item" (page 182). That description more accurately describes what `SPACE$(n)` does in a `PRINT` statement. `TAB(n)` moves the print position to column `n` and then prints the next item in the next column (that is, `n + 1`). If the print position already exceeds column `n`, then `TAB(n)` has no effect.

The owner's manual states that "MAXRAM contains the memory size of your Model 100" (page 157). That statement is misleading at best. I got suspicious when on my 24K machine, `PRINT MAXRAM` produced 62960 which made it look like I had a full house of 32K ROM plus 32K RAM. It turns out that the lower 32K are taken up by the ROM,

and then the 8K RAM blocks are filled in from top to bottom. Thus the empty 8K on a 24K machine are in the middle at hex addresses 8000 to 9FFF. The `MAXRAM` function therefore has nothing to do with memory size; it merely tells the highest address the system will let you use.

`STR$` converts a numeric expression to a string representation of its value. The documentation (page 182) fails to

mention one important feature. The first character in the resulting string gives the sign of the number, either as `"."` if negative or as a space if positive. Therefore the example given in the manual is wrong. If `BAL` is set to 133, then `B$ = "$" + STR$(BAL) + ".00"` does not set `B$` to `"$133.00"`, but rather to `"$ 133.00"`.

`MID$` may occur on the left hand side of an assignment statement to replace

## ALPHABETICAL SUMMARY LISTING

*A summary of bugs and undocumented features of Model 100 BASIC listed alphabetically by keyword. Also given is the number of the page in the owner's manual on which these notes can be written in the margin.*

| KEYWORD             | PAGE | COMMENT   |
|---------------------|------|---|
| <b>ABS</b>          | 127  | missing; returns absolute value of numeric expression   |
| <b>ASC</b>          | 127  | missing; returns ASCII code for first character in a string; null string gives <code>?FC</code>   |
| <b>CONT</b>         | 132  | altering program clears all variables, closes all files   |
| <b>DAY\$</b>        | 135  | closing quote omitted in example  |
| <b>DEFSTR</b>       | 136  | defines as string, not "integer"  |
| <b>END</b>          | 138  | also closes all files   |
| <b>FILES</b>        | 140  | marks ".BA" program currently loaded with asterisk  |
| <b>INPUT\$</b>      | 147  | loses last characters if EOF hit in middle of operation   |
| <b>KILL</b>         | 150  | trying to delete current program file (starred in <code>FILES</code> ) gives <code>?FC</code>   |
| <b>LINE INPUT #</b> | 154  | missing; reads to next carriage return or 255 characters, whichever comes first; carriage return and following line feed not returned; gives <code>?SN</code> in Direct Mode on lines 3 or longer, but gives result |
| <b>MAXFILES</b>     | 157  | clears all variables and closes all files   |
| <b>MAXRAM</b>       | 157  | not memory size, but highest address you can access; empty RAM blocks at bottom   |
| <b>MID\$</b>        | 159  | position parameter of 0 gives <code>?FC</code>  |
| <b>MID\$ =</b>      | 160  | length parameter is not ignored   |
| <b>NEW</b>          | 161  | also closes all files   |
| <b>OPEN</b>         | 165  | <code>?BN</code> error means <code>MAXFILES</code> must be set higher   |
| <b>PRINT</b>        | 168  | expression list is optional; gives blank line if absent   |
| <b>PRINT #</b>      | 169  | terminates lines in RAM files with carriage return (code 13) followed by line feed (code 10); gives <code>?SN</code> if expression list omitted   |
| <b>PRINT @</b>      | 169  | missing; prints at given screen position, where position is <code>row * 40 + column</code> (see worksheet on page 210)  |
| <b>RUN,R</b>        | 176  | gives <code>?SN</code>  |
| <b>SAVE</b>         | 177  | gives <code>?FC</code> if there is a starred file in <code>FILES</code> display   |
| <b>STR\$</b>        | 182  | returns a leading space on positive numbers   |
| <b>STRING\$</b>     | 182  | gives <code>?FC</code> on null string   |
| <b>TAB</b>          | 182  | skips to column <code>n+1</code> , but only if that column not passed; comes up short when total line length nears 255  |
| <b>VAL</b>          | 184  | ignores leading blanks and trailing non-digits; returns zero if no digits   |
|                     | 211  | <code>BKSP</code> generates 8, <code>TAB</code> generates 9, <code>ENTER</code> generates 13  |



# A COSTLY MISTAKE IN MANAGING YOUR SALES FORCE.

You call. He's out.  
He calls back. You're out.  
You can lose hours that way—and countless sales.

That's why you need MCI Mail®. It lets you use your PC to contact your sales force directly anytime of the day. Send and receive messages instantly.

## MCI Mail

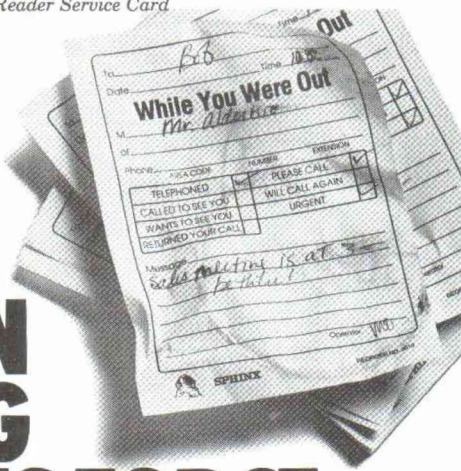
### NOW IS THE TIME FOR MCI MAIL.

© 1985 MCI Communications Corp. MCI Mail® is a registered service mark of MCI Communications Corp.

Or get sales forecasts and competitive information.

MCI Mail makes your sales force more productive so they can close more deals. And boost your bottom line.

Call 800-MCI-2255 or in Washington, D.C., 833-8484 and increase your profits instead of increasing your phone bill.



## BUGS

characters in the middle of a string. It takes three parameters: the string to change, the position in the string at which the characters are to be replaced and a length parameter. The owner's manual says, "Length is optional; if present it is ignored" (page 160). Quite to the contrary, the length parameter when present tells how many characters in the target string are to be replaced.

The manual gives the following example:  $1000 \text{ MID}\$(A\$,5) = \text{"ABCDEF"}$ . If A\$ equals "00000000" beforehand, then this statement sets A\$ to "0000ABCD." The documentation would lead us to believe that  $1000 \text{ MID}\$(A\$,5,2) = \text{"ABCDEF"}$  would have the same effect. But the length parameter is not ignored; it says to replace only 2 characters, beginning with the fifth. Therefore A\$ is set to "0000AB00".

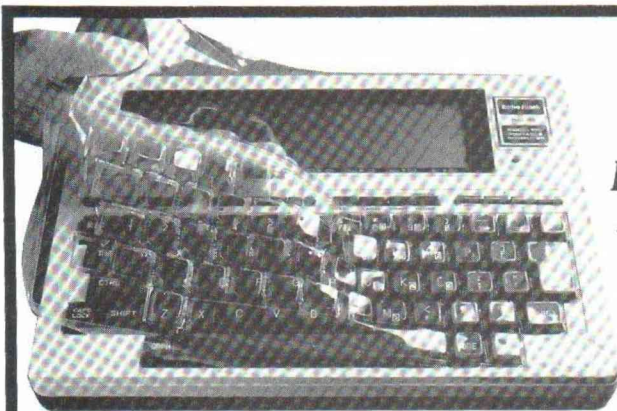
## UNDOCUMENTED COMMANDS

There are a number of commands missing altogether from the "BASIC Keywords" section of the owner's manual (pages 127 to 185). What should be the first two in the list are missing: ABS which returns the absolute value of a numeric expression, and ASC which returns the ASCII code for the first character of a string expression. These do appear on page 12 of the Quick Reference Guide. Two other missing commands are PRINT @ and LINE INPUT #. These appear in the Quick Reference Guide, but not with enough documentation to explain their use.

PRINT @ prints the named items at a specific screen position. For instance, PRINT @140,TIME\$ prints the current time at position 140. The trouble is, the documentation doesn't explain where position 140 is. The key to the puzzle is found in the "Print @ Worksheet" on page 210. There we find that the rows of the screen are numbered from top to bottom as 0 to 7, and the columns from left to right as 0 to 39. A screen position for PRINT @ is computed as  $R*40+C$ , where R is the row address and C the column. If you prefer counting from 1 to 8 and 1 to 40, then the formula becomes  $(R-1)*40+(C-1)$ .

So where is position 140? The row address is the integer quotient of 140 divided by 40, or 3, and the column address is the remainder of 140 divided by 40, or 20. Counting from 1, that is row 4 and column 21.

The LINE INPUT command for keyboard input is documented, but not the corresponding command for file input. For example, LINE INPUT #1,A\$ reads the next line from the file opened as 1



## NEW!

### For Model 100 NEC PC-8201

# SafeSkin™

## KEYBOARD PROTECTOR

**Finally! A keyboard cover that remains in place during use!**

SafeSkin prevents costly downtime and repairs due to liquid spills, dust, smoke, cigarette ashes, paper clips, staples and other environmental hazards. SafeSkin is made of ultra-thin, ultra-tough, clear flexible plastic, molded to fit every key and contour, allowing normal key response and feel. This custom fit cover is easily removed for cleaning and gives years of dependable service. Available for the Model 100, NEC PC-8201, IBM PC, XT, AT, Apple, C64 and many other popular computer models. Send 29.95, Check or M.O., Visa & MC include expiration date. Specify computer type. Dealer inquiries invited. Free brochure available.

MERRITT COMPUTER PRODUCTS, INC.

2925 LBJ Fwy., Suite 180 / Dallas, Texas 75234 / (214) 942-1142



## BUGS

and puts it into A\$. As documented for LINE INPUT (page 154), this command assigns the next line of input (including all commas, leading blanks and quote marks) to the string variable. But there are a number of extra details one must know to use the command on a typical RAM file.

Since the maximum length of a string variable is 255 characters, the command can input no more than 255 characters. Therefore, the command inputs all characters up to the next carriage return (ASCII code 13) or it inputs the next 255 characters, whichever comes first. When 255 characters are read, the end of the line has not yet been reached. The next LINE INPUT # command continues reading with the 256th character of the line. If a line is exactly 255 characters long, then the first call to LINE INPUT # reads the 255 characters, and the next call hits the carriage return and returns a null string of length 0. The terminating carriage return is not returned as part of the string. Thus the only way to know if the string returned by LINE INPUT is a complete line, or only part of a line, is to test the length. If the length is less than 255, then the string had a terminating carriage return and there is room to concatenate a CHR\$(13) to the string if that would simplify processing. If the length is 255, then the end of the line has not yet been reached.

When outputting to a RAM file, PRINT # puts both carriage return and line feed (ASCII codes 13 and 10, respectively) at the end of a line. LINE INPUT # reads everything up to the next carriage return. If the character after that is a line feed, then that character is consumed as well and not returned. If, however, one uses the INPUT\$(n,f) function to read a RAM file, all the carriage returns and line feeds are returned as individual characters. Thus, LINE INPUT # appears to have a bug. If a line feed immediately precedes a carriage return, LINE INPUT # misses the carriage return and reads two lines at once.

### UNDOCUMENTED FEATURES

It is well documented that the CLEAR command sets all numeric variables to zero, sets all string variables to empty and closes all open files. However, there are three undocumented instances where Model 100 BASIC performs the clear function as a side effect: on MAXFILES, on NEW and when a program is altered. Setting MAXFILES does a clear. This means the MAXFILES command must precede any statements which initialize variable values. NEW

# Here's \$10 Bucks

To introduce you to our line of

## SUPER SOFTWARE

for the Model 100, Tandy 200 & NEC 8201A

That's right! Use the coupon below (or a reasonable facsimile), and take \$10 off your next order. Limit one per customer. Coupon expires February 28, 1986.

**So Hurry!**

Custom Software • 1308 Western • Wellington Ks 67152



## DATA ACQUISITION & CONTROL

Battery powered interface for the Model 100. Gives Analog and Digital I/O capabilities to your Radio Shack, NEC or Epson. Whether in the lab or in the field, Data Acquisition and Process Control are now more affordable than ever. Easy to program using BASIC input and output statements. Systems from \$549.



### Complete PL-100 System includes:

- Expansion Chasis (holds 3 boards)
  - Combination I/O board with
    - 16 Channel 8 or 12 Bit A/D
    - 4 Channel 8 Bit Analog Output
    - 4 Analog Level Sense Inputs
    - 16 Bits Digital Output
    - 16 Bits Digital Input
  - Battery Charger / AC Adapter
  - 2 Empty expansion slots
  - Interface Cables
  - Uses rechargeable batteries
  - Provides power to the computer
- Expansion boards available:
- High Accuracy 12 Bit Analog I/O
  - Digital I/O-Counter/Timer
  - Combination Analog & Digital I/O
  - Relays, TRIACS, Opto Isolator, Thermocouple, etc.
- Serial Interface available—communicates with any computer. (IBM, Apple, etc.)

Call the factory.

**ELEXOR  
ASSOCIATES**

**(201) 299-1615  
P.O. Box 246,  
Morris Plains, NJ 07950**



not only clears the variables as stated in the owner's manual (page 161), but it also closes all open files. Whenever a program is altered, all variables are cleared and all files closed. This can be a nuisance in program debugging, for every time a patch to the program is made, all variables and files must be set up again before retesting. This feature should be noted under CONT (page 132) where it is observed that you cannot resume program execution if you alter the program; the reason is that BASIC does a CLEAR. Also undocumented is the fact that the END command (page 138) automatically closes all open files (but does not clear variables).

The documentation often fails to describe what happens with functions on boundary conditions, and what the sources of error are. For instance, with ASC and STRING\$, if the string argument is null then the result is an ?FC (illegal function call) error. If the string is longer than one character, only the first character is used and the remainder is ignored.

On the string segmenting functions (LEFT\$, MID\$, RIGHT\$), if the string argument is null there is no error; the result is null. If the position parameter

exceeds the length of the string, then no error results; a null string is the answer.

Zero values for the length parameter in these functions yield a null string. However, a zero value for the position parameter of MID\$ results in ?FC (illegal function call). Always initialize a variable before using it for the position pointer.

VAL (page 184) converts a string to its numeric value. All leading blanks are ignored. All trailing non-digits are ignored. If the string contains no digits, then zero is returned without an error.

The OPEN command (page 165) generates the ?BN (bad file number) error if MAXFILES has not been setup in advance to handle the required number of files.

The description of PRINT (pages 168-9) fails to mention that the expression list is optional and that PRINT by itself produces a blank line.

The description of FILES (page 140) fails to describe the meaning of the asterisk that appears at times following the name of a file. This appears to mark the name of the ".BA" file which is currently in use. When you enter BASIC by selecting a ".BA" file in the menu, that file will be starred. When

you enter by selecting "BASIC" in the menu, no file is starred. However, once you SAVE a program to RAM, that file is starred. Also, if you enter via "BASIC", but then LOAD a ".BA" file, that file is starred.

The SAVE command has a built-in interlock with the asterisk (another undocumented feature). Whenever the FILES display has a starred current program file, any attempts to SAVE the program to RAM (even under a different name) are blocked by an ?FC (illegal function call) error. Saving the program in ASCII format with the ".A" suffix is not prohibited. Similarly, it is not permitted to KILL the currently loaded ".BA" file. This too generates an ?FC error.

Three of the keys which generate ASCII codes are not documented in the "ASCII Character Code Tables" on page 211. Bksp (backspace) generates code 8. Tab generates code 9 and Enter generates code 13. □

Please help us rate this article's value. If you've found it very valuable, circle 167 on the Reader Service Card. If it was moderately valuable, circle 168—and if it wasn't valuable to you, circle 169.

## SHED A NEW LIGHT ON YOUR MODEL 100



The Glare Shield®

The Glare Shield® eliminates glare and eases eyestrain when using the M100. The frosted Acrylic diffuser spreads light evenly across the LCD for improved visibility without hot spots.

- Diffuser closes to form a dust cover.
- All cable ports remain accessible.

Send your check or money order for \$29.95 to:

**CORIOLIS INCORPORATED**

1924 Cedar Lake Parkway  
Minneapolis, Minnesota 55416

Minnesota residents add 6% sales tax. (Postage and handling included)

Circle 9 on Reader Service Card

## 8K RAM

# \$29.95

+ \$2.00 SHIPPING  
No assembly required.

### NEW LAPWORD™

Machine language word processor for M100, M200, NEC 8201A. 3,280 bytes. \$49.95 plus \$2.50 shipping. \$10.00 discount with RAM CHIP order.

Call or write The Covington Group / 310 Riverside Drive, Suite 916, New York City, NY. 10025 / 212-678-0064, 846-1700.

Circle 12 on Reader Service Card



anything you like, such as a period.

A wonderful feature is the ability to call up an alternate input file. This allows you to set up one commonly used file such as your letterhead which would include your name, address and phone number. You can then specify a command which allows you to call up the information in that file at the beginning of each of your letters. You would not have to re-type this information each time. This saves time as well as memory because the desired text does not take up memory at the beginning of each text file.

This feature can be extended into a mail merge file. An example would be to set up two different files. One file would be a form letter and the other would be a list of names and addresses. You can then command DO4MAT to print your letters. Presto! You have a personalized letter for each person on your list.

The first version of the program I received was Rev. 1.0. I did not have any problems with it. Approximately a week later BKI sent Rev. 1.1, which corrects a bug which made the program lose the last word of a page in cut sheet mode (pause at end of page). The new version was fixed.



## THERE'S ALWAYS SOMETHING

By now you probably have your check signed, sealed and delivered. I don't blame you. It's a great program but nothing's perfect. I've left the bad news till last.

DO4MAT is a BASIC program approximately 8.5 kilobytes (K) long. This means it requires a 24K computer but works better on a 32K machine. Execution speed isn't slow considering that it's in BASIC.

Another gripe I have is with the manual. It's not very well written. First it was printed on a dot matrix printer, making it hard to read. Second, there's no index, making it hard to find something without looking through all 70 pages.

Furthermore there's no quick reference card you'd expect with a program this advanced. I wouldn't recommend this program to a beginner because in BKI's quest to include as many advanced features as possible they dropped that old standby: user friendliness. The company's customer support, however, is very good.

Despite the above gripes, DO4MAT is a good program. Some of the features rival those available on a desktop computer. I'd recommend it to anybody who wants or needs a very powerful cassette-based text formatter but at the same time doesn't want to shell out all his hard-earned bucks to buy a more expensive program on ROM. □

# EZB™

## Lets You Know Values the EASY Way



### Fine Art Appraisal - Made Portable

Oil Painting, Watercolor, Pastel, Drawing 1000 Early day Western American painters and 500 very collectable Western contemporaries included.

Ground-breaking ROM allows anyone to accurately evaluate originals from \$100 to \$1,000,000 and more. Program + semi-annual updates put you in business. System provides High/Low price range; lists galleries, authorities by painter's name.

### Diamond Appraisal - Once In A Lifetime

The diamond doesn't change, values do - ENCompass reappraisal revolutionizes ancient art on your Model 100.

### Easy Does It - With Easy Budget

At your fingertips - an incredibly flexible budgeting tool designed for home and business use. With EZB multiple calculations can be made simultaneously within exacting zero based constraints.

Monthly figures become instantaneously weekly/daily/hourly/yearly/and percentages, etc. The package contains "make sense" household budgeting and food cost profiles for immediate use.

Get all three programs on a ROM for \$195.; EZBudget still available on cassette for \$29.95, VISA and Mastercard.

Make checks payable to:

## ENCompass™

1373 E. Whitton, Phoenix, AZ 85014 (602) 955-3124

**EZB - One Honey of a Program**

Circle 21 on Reader Service Card

# TRS-80

## ALWAYS AT SALE PRICES



## WE SHIP FAST!

DFW COMPUTER CENTER

326-MAIN ST.,  
GRAPEVINE, TEXAS 76051  
(817) 481-SALE

**OUR TRS-80s Have the Radio Shack warranty**



To get YOUR SALE price CALL:

## 1-800-433-SALE

Circle 15 on Reader Service Card



## PROTECT YOUR APPLE...



## IN A CABBAGE!

Now, take your computer with you anywhere you go... completely protected... in a custom-designed case by Cabbage. Any brand... including any peripheral hardware. We design... just for you.

Unsurpassed quality and craftsmanship... that's a Cabbage!

**Best Protection for... Anything!**

- Audio-Visual Equipment
- Electronic/Optical Equipment
- Computers
- Musical Instruments
- Medical Equipment
- Scientific Instruments

### CABBAGE CASES

2458 Wood Avenue  
Columbus, Ohio 43221  
(614) 486-2495

*"Nothing's Tougher... Than a Cabbage"*

## Music Composer's Toolbox

### M100 + MIDI = MUSIC

512K RAM Disk  
stores 220K notes.  
Complete software  
and hardware for  
any MIDI synthesizer.  
**only \$1195.**

**RMD & Associates**

1210 N. Jefferson  
Suite H  
Anaheim, CA 92807  
(714) 632-9391

## EGGNOG (from page 45)

```

100 'EGGNOG PARTY PLANNER
110 'by FRED W. FORRESTER
120 PRINT
    :INPUT "How many guests will you serve";G
    :PRINT
130 PRINT "How many drinks will you serve each"
140 INPUT "guest (allowing 6 oz. per guest)";D
150 CLS
160 '(E)GGNOG;(B)OURBON;(R)UM;WHIPPING (C)REAM
170 E=4.75
    :B=.9
    :R=.45
    :C=.6
180 E1=(E*G*D)/8
    :E2=INT(E1)
    :E3=(E1-E2)*8
    :E4=INT((E3+.005)*100)/100
190 B1=(B*G*D)/8
    :B2=INT(B1)
    :B3=(B1-B2)*8
    :B4=INT((B3+.005)*100)/100
200 R1=(R*G*D)/8
    :R2=INT(R1)
    :R3=(R1-R2)*8
    :R4=INT((R3+.005)*100)/100
210 C1=(C*G*D)/8
    :C2=INT(C1)
    :C3=(C1-C2)*8
    :C4=INT((C3+.005)*100)/100
220 PRINT "You need the following for your party
    of";G
230 PRINT
240 PRINT "Press Q for quantities needed"
250 Z$=INKEY$
    :IF Z$="" THEN 250
    :CLS
260 PRINT "You need the following"
270 PRINT "EGGNOG          ";E2;"CUPS AND ";
    E4;"OZS."
280 PRINT "BOURBON          ";B2;"CUPS AND ";
    B4;"OZS."
290 PRINT "RUM              ";R2;"CUPS AND ";
    R4;"OZS."
300 PRINT "WHIPPING CREAM ";C2;"CUPS AND ";
    C4;"OZS."
310 PRINT
    :PRINT "Press I for instructions"
320 X$=INKEY$
    :IF X$="" THEN 320
330 PRINT "Pour the eggnog into a large bowl. Add"
340 PRINT "the liquors one cup at a time, stirring"
350 PRINT "slowly. Whip the cream (no flavoring),"
360 PRINT "cover and chill. When ready to serve,"
370 PRINT "fold in the whipped cream, and sprinkle"
380 PRINT "with nutmeg. HAPPY HOLIDAYS!"

```



**CLOCK** (from page 28)

```

1450 '
1460 ' put in random dots
1470 '
1480 DX = RND(1) * 113 + 1
1490 DY = RND(1) * 2
1500 IF DX > 57 THEN DX = DX + 125
1510 IF DY THEN PSET (DX, RND(1) * 122 + 1) ELSE
PRESET (DX, RND(1) * 121 + 1)
1520 '
1530 ' Check for keyboard commands
1540 '
1550 IN$ = INKEY$
1560 IF IN$ = "" THEN 1630
1570 IF IN$ = "M" OR IN$ = "m" THEN MENU
1580 IF IN$ = "R" OR IN$ = "r" THEN 1260
1590 IF IN$ = "Z" OR IN$ = "z" THEN TIMES =
MID$(TIMES,1,5)+":00"
1600 '
1610 ' Calculate & display time
1620 '
1630 TS = MID$(TIMES,1,5)
1640 OH = VAL(MID$(TS,1,2))
1650 IF OH < 12 THEN AP$ = " AM" ELSE AP$ = " PM"
1660 IF OH > 12 THEN OH = OH - 12
1670 IF OH = 0 THEN OH = 12
1680 '
1690 PRINT @256,DAT$
1700 PRINT @374,STR$(OH)+MID$(TIMES,3,6)+AP$
1710 '
1720 ' If it's the same minute, reiterate
1730 '
1740 IF VAL(MID$(TS,4,2)) = OM THEN 1480
1750 '
1760 ' Remove the last minute's hands
1770 '
1780 LINE (120,62)-(120.5+MX*54,62.5-MY*54),0
1790 LINE (120,62)-(120.5+HX*40,62.5-HY*40),0
1800 '
1810 ' Calculate new hand positions
1820 '
1830 OM = VAL(MID$(TS,4,2))
1840 MX = SIN(OM*6*RD)
1850 MY = COS(OM*6*RD)
1860 HX = SIN((OM/60+OH)*30*RD)
1870 HY = COS((OM/60+OH)*30*RD)
1880 '
1890 ' Draw new hands
1900 '
1910 LINE (120,62)-(120.5+MX*54,62.5-MY*54)
1920 LINE (120,62)-(120.5+HX*40,62.5-HY*40)
1930 '
1940 ' Return to infinite time loop
1950 '
1960 GOTO 1480

```

## CHARGE ON!

### NEVER RUN OUT OF BATTERIES AGAIN!!!

- Power Accessories for Model 100, M10, and NEC 8201
- Special CHARGE ON KIT comes with charging unit, battery holder (batteries not included), mounting material & special cables for use in car or home.

CHARGE ON KIT \$24.50

Auto connection cables only  
\$10.00

(allows portables to work off car battery only)

- Unit will not damage computer or auto charging system.
- No installation required or modification to computer

30 day money back guarantee

Add \$3.00 for shipping & handling.

Make checks payable to:

**CHARGE ON!**

**P.O. BOX 6087-C**

**ANAHEIM, CA 92806**

MC/Visa also accepted

Allow 4-6 weeks for delivery.

## Tandy 200/100 Software

- **Loan Manager** **\$19.95**  
—Computes regular payments of a loan, term of a loan, remaining balance, last payment, annual interest, principal, amortization tables
- **Investment Manager** **\$24.95**  
—Computes future values of investments, savings, annuities & much more
- **Graph Pak** **\$19.95**  
—Plots data from a text file or you can enter data as you work, line graphs, bar graphs & pie charts, also a mailing label program & a print formatter are included
- **Basic Pak** **\$19.95**  
—Basic program debugger, program packer (to conserve memory), renamer, rename, listing formatter
- **Ram Pak** **\$19.95**  
—Memory dumps, disassembler, hex/decimal conversions

These menu driven programs come with clear, concise documentation which is written in English—not computerese.

Check—Money Order—C.O.D.

N.J. Residents add 6% sales tax

Add \$2.00 shipping & handling

**Data Transfer, Inc.**

306 Rancocas Blvd.

Rancocas Woods, NJ 08060

609-234-6506



## COMET WATCHERS - NAVIGATORS

|                |  |
|----------------|--|
| DA 01/04/1986  |  |
| UT 23:12:16    |  |
| LA 42°50.6'N   |  |
| LO 070°20.8'W  |  |
| FV 060° MA 9.0 |  |
| ID Halley      |  |
| AZ 238°09.4'   |  |
| AL 25°14.5'    |  |

Spot Halley's Comet among the stars, planets, Moon, and Sun, displayed just as you see the sky, at any time, from any place. Point out any of 180 celestial bodies with the cursor. ASTRO shows name, brightness, direction, and altitude. Manual and cassette for 24K TRS-80/100. \$39.95 + \$2.00 S/H, Visa, M/C. Loquor Enterprises, 3 Heneage Lane, Hanover, NH 03755  
ASTRO - A PLANETARIUM IN YOUR LAP

## NEW MASS STORAGE SYSTEM FOR ONLY \$69.95

### GREAT PERFORMANCE — INCREDIBLE PRICE

A&J Micro Drive would like to announce its new portable System 100. This mass storage system, designed for the Radio Shack Model 100, offers high speed storage for the price of a cassette.

The System 100, with electronics and software designed by A&J Micro Drive, uses the latest Micro Wafer Technology developed by Entrepo Inc. The new system combines high speed digital electronics with low cost, high performance Micro Drive Technology.

### INTERESTED . . .

The 100's compact operating system is smaller than that of the Radio Shack Disk Drive.

The latest release of the operating system may be down loaded by calling the computers at A&J Micro Drive using the simple instructions included with the unit.

The System 100 may be small enough to fit into a corner of your briefcase and require only 4 "AA"-size batteries for months of use — but don't be fooled, our new unit is packed with state of the art electronics. It will give you ultra reliable program loading as fast as the disk, and twenty times faster than the cassette.

The System 100 uses a miniature endless loop tape cartridge called a Micro Wafer. The Micro Wafer, approximately the size of a credit card, is completely enclosed in a protective housing. A built-in cover retracts as the tape is inserted into the drive, exposing the video-grade digital magnetic tape to the read/write head. Micro Wafers come in several lengths, allowing the customer to choose the length best suited to his application.

### STILL INTERESTED . . .

The price of \$69.95 includes a drive system with cable attached, one Micro Wafer, operating instructions and one-year membership to the A&J Bulletin Board. Price effective through 1985. Wouldn't you like to have on under your Christmas tree?

#### Manufacturer's Specifications

System 100  
A&J Micro Drive  
1050 E. Duane Ave. Ste "I"  
Sunnyvale, CA 94086  
(408) 732-9292

#### Price: \$69.95

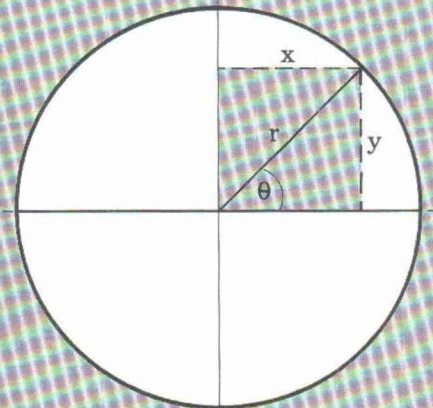
Baud Rate: 14,000 bits/second  
Tape Speed: 8 inches/second  
Capacity: 2K bytes/foot tape  
10' = 20K bytes  
62' = 124 K bytes  
Lengths: 10, 20, 35, 50, & 62'  
Power Supply: 4 "AA" cells  
Connection: Uses RS-232 port  
Cable: 30 inch RS-232 attached  
Size: 6 x 4 x 2.5 inches  
Weight: 24 ounces

## CLOCK (from page 28)

Lines 1320 and 1330 divide the screen into three boxes. The large square in the middle of the LCD is the home of the clock face. The two side rectangles are used for the random dot patterns.

The hour tick marks are drawn by the FOR-NEXT loop at lines 1370 through 1410. Coordinates (120,62) indicate the center of the LCD display, and the ticks are to be located 58 units from the center. As the variable OH varies from 0 to 11, 30 times that value moves between 0 and 330 degrees in 30-degree increments. The process of calculating the  $x$  and  $y$ -coordinates from the angle and length is called *polar to rectangular conversion* — see Figure One.

Figure 1: In a circle, if  $r$  is the radius (length of the hand) and  $\theta$  is the angle in radians, then  $x = r \sin(\theta)$  and  $y = r \cos(\theta)$ .



If the angle  $\theta$  is in radians, then  $x = r \sin(\theta)$ ;  $y = r \cos(\theta)$

### DOT TO DOT

The random dots are created in lines 1480-1510. Two random-number calls generate the  $x$ -coordinate and color (black or white) of the dot. If the dot's  $x$ -coordinate is located between 1 and 57, then it goes in the left side. If it's greater than 57, add a displacement of 125 to move the dot to the right side. Another random-number call determines the  $y$ -coordinate of the dot.

The keyboard is scanned between lines 1550 and 1590. If no key has been depressed, then the individual comparisons are skipped.

The correct time is read and processed in lines 1630 through 1670. The 24-hour format time is converted to 12-hour AM/PM format. Lines 1780 and 1780 print the time and date on the screen, and can be deleted if that feature's not desired.

Line 1740 checks the current minute



# CLOCK

against the last time the hands were drawn. New hands are drawn only on a new minute.

Every minute, the old hands are removed by lines 1780 and 1790. The hour hand is 40 units long, the minute hand 54 units long.

The coordinates for the hour and minute hands are calculated by lines 1830 through 1870. The hour hand is accurately moved fractionally with the minute hand.

The new hands are drawn in lines 1910 and 1920. Line 1960 returns to the perpetual loop, and another round begins.

## CUP OF SUGAR

The BIGBEN.BA program is more than just an exceptionally clever clock — it's a source of a few programming tips.

The "clock hand" problem is a common one. A game that simulates the sweeping bar on an aircraft radar, for example, will need to be able to calculate the proper coordinates for the moving lines.

Lines 1370-1410 can be a guide for drawing circles: Just change the value 58 to the radius and 120 and 62 to the desired center. Set the 11 in the FOR statement to a multiple of 360 less one, such as 35 for 10-degree increments. In figures, that's  $(360/10)-1$ . Finally, adjust the 30 in the trigonometric function to that same degree increment.

Changing 24-hour times to the normal AM/PM clock is always exciting, and much more user-friendly. Here's the process:

1. Extract the hour from TIME\$ (the first two characters) or from the time variable. Be sure to convert it from character to numeric format, if necessary.

2. If the hour is less than 12, then it's AM. If the hour is greater or equal to 12, then it's PM. Note that the hour 12 (as in 12:00 through 12:59) is afternoon, and the hour after midnight is morning.

3. If the hour is greater than 12, then subtract 12. So, 13:00 becomes 1:00 and 21:30 becomes 9:30. Of course, 12:00 stays 12:00.

4. If the hour is the hour after midnight — 00 — then make it hour 12. Some 24-hour clocks call that hour 24, some (including the Model 100 and Tandy 200) call it hour zero. We'll just call it 12:00 AM. □

Please help us rate this article's value. If you've found it very valuable, circle 170 on the Reader Service Card. If it was moderately valuable, circle 171—and if it wasn't valuable to you, circle 172.

# LAPSTAR

60 columns

by

10 lines

The WORDSTAR<sup>®</sup> like text processor that lets your M100 / NEC8201 display 55% more text on the screen than before. Plus gives you many more text entering and editing commands than TEXT. Now with free text formatter included.

Now!  
Available  
**NEC 8201**  
version N

**CISS  
CORP**

3780 Manor House Drive, NE  
Marietta, GA 30062  
(404) 992-2200

ONLY  
**\$74.95**

\*WORDSTAR is a trademark of Micro-Pro Inc.

For 16k and larger machines.

# PORTABLE EXPANSIONS

**MODEL 100/200 EXPANSION MODULES!**  
SEE OUR FULL PAGE AD IN THIS ISSUE



**TTXpress MODEL 1280 \$99**  
**Portable Thermal Printer**  
FREE printer cable

Half the size of a Model 100, battery operated (4 "C" cells, internal), 2.2 lbs., uses 8½" wide white thermal paper, 40 cps unidirectional (50 cps with A/C adaptor), 80 or 160 chars./line, condensed, enlarged, emphasized, bit graphics, true descenders, underline, H/V tabs. . .

**Accessory kit for above \$24**

Includes A/C adaptor, 80 ft. roll of paper, and a simulated leather case.

## THINGS JUST FOR THE NEC PC-8201A

**SideCar 128K RAM cartridge \$259**

See our August '85 Full Page Ad

**PSCALC \$88**

A spreadsheet program in a 32K ROM CHIP. Plugs into the ROM socket.

### FREE SHIPPING, HANDLING, AND INSURANCE

for Cont. USA. Ordered today—shipped tomorrow UPS. 30-day total satisfaction, money back guarantee. We honor Visa, M/C, AmExp, and Money Orders. Checks take 3 weeks to clear.

**PURPLE  
COMPUTING**

**(800) 732-5012**  
**(805) 987-4788 (in Calif.)**

420 CONSTITUTION AVE., CAMARILLO, CA 93010



## METAB

Calculates metabolic rate,  
caloric intake and  
change in weight.

\$15.00

## ADDRESSER

Prints from "ADR S.DO"  
labels, letterheads and  
envelopes.

\$10.00

## D ADDRESS

Stores or prints addresses,  
disk-formatted letterheads  
and envelopes.

\$20.00

## SPELLER 2

"DO" file spelling checker.

\$30.00

## D SPELLER

"DO" file spelling checker  
from 1000 word + dictionary  
stored on disk.

\$60.00

## PSYCHI

A psychiatric evaluation.

\$40.00

All programs come on  
5 1/4" disk or cassettes  
with documentation.

## SOFTMATE

P.O. Box 15157  
Portland, OR 97215-9998

503-238-1490

Circle 52 on Reader Service Card

## NAVIGATING (from page 41)

### BEARDI BASIC Program Listing

```
100 REM BEARING and Distance calculator BEARDI
110 REM given Latitude and Longitude
120 REM of two points
190 PRINT "ENTER FROM LAT/LONG"
200 INPUT "enter LAT deg,min ";F1,F9
205 F1=F1+F9/60
210 INPUT "enter LONG deg,min ";F2,F9
215 F2=F2+F9/60
220 PRINT "ENTER TO LAT/LONG"
230 INPUT "enter LAT deg,min ";T3,T9
235 T3=T3+T9/60
240 INPUT "enter LONG deg,min ";T4,T9
250 T4=T4+T9/60
560 Z=57.2958
570 A=F1/Z
580 O=F2
590 B=T3/Z
600 L=O-T4
610 IF L>180 THEN B=L-360
620 IF L<-180 THEN L=L+360
630 L=L/Z
640 D=(SIN(A)*SIN(B))+(COS(A)*COS(B)*COS(L))
660 D=-ATN(D/SQR(-D*D+1))+1.5708
670 C=(SIN(B)-(SIN(A)*COS(D)))/(COS(A)*SIN(D))
690 C=-ATN(C/SQR(-C*C+1))+1.5708
700 IF L<0 THEN H=360-(C*Z)
710 IF L<0 THEN GOTO 730
720 H=C*Z
730 CLS
740 PRINT USING "Bearing = ###.## Degrees";H
750 PRINT USING "Distance = #####.## Nautical Miles";D*Z*60
760 PRINT USING "Distance = #####.## Statute Miles";D*Z*60*1.15078
770 PRINT USING "Distance = #####.## Kilometers";D*Z*60*1.8518518518518
780 INPUT H
790 CLS
```

There are many reasons for calculating bearing and/or distance between two known locations. Applications include, among others, making enroute "fixes" for aircraft flight planning, similar calculations for marine navigation and even determining what direction to point an antenna for amateur radio or television purposes.

When you can do these calculations other uses arise, such as calculating how many degrees off course KAL 007 would have had to be in order to brush Russian airspace. Invention is the mother of necessity.

### LATITUDE AND LONGITUDE

Using this program requires that the location of two points stated as latitude and longitude be known. The combination of latitude and longitude are also referred to as coordinates.

Latitude defines locations relative to the equator. The equator is zero (0) degrees latitude, the North Pole is 90 degrees north and the South Pole is 90 degrees south. When using the BEARDI program enter north latitudes as positive numbers between zero (0) and 90. Enter south latitudes as negative, between zero and -90.

Longitude defines positions east and west of a line connecting both poles and

passing through Greenwich, England, a borough of London which was formerly the site of an astronomical observatory. Locations west of the prime meridian are defined by the range zero to 180 degrees west. Locations east of the prime meridian are defined by the range 0 to 180 degrees east. The line connecting the poles on the opposite sides of the earth is ambiguously defined as both 180 degrees east and 180 degrees west of the prime meridian.

When using BEARDI, latitudes between 0 and 180 degrees east are entered as positive and western latitudes are negative. For example, because all the United States lies east of the prime meridian and north of the equator, all latitudes and longitudes are positive.

### SPHERICAL TRIGONOMETRY

Two equations based on spherical trigonometry (see Table 1) are required to calculate bearing and distance between two points. The first equation calculates distance between the two points in degrees of arc relative to the center of the earth (one degree = 60 nautical miles). The second calculates the bearing between the two points in degrees.

The bearing calculated is from the first point to the second point; north is zero degrees, east is 90 degrees, south is



# NAVIGATING

Table 1.

## EQUATIONS USED TO CALCULATE BEARING AND DISTANCE

$$\cos D = \sin A \sin B + \cos A \cos B \cos L$$

$$\cos C = \frac{\sin B - \sin A \cos D}{\cos A \sin D}$$

where: A = FROM latitude in degrees

B = TO latitude in degrees

L = FROM longitude - TO longitude

If the result is outside the range  $\pm 180$

360 is algebraically added or subtracted

to give a result between  $\pm 180$  and  $\pm 180$ .

D = Distance along great circle path from FROM to TO in degrees of arc relative to the center of the earth.

C = True bearing from North is L is positive

If L is negative then true bearing =  $360 - C$

Table 2.

## LATITUDE AND LONGITUDE OF SOME MAJOR AIRPORTS OF THE WORLD

| Facility             | Latitude<br>(deg, min) | Longitude<br>(deg, min) |
|----------------------|------------------------|-------------------------|
| Boston (BOS)         | +42,22                 | +71,0                   |
| Chicago (ORD)        | +41,59                 | +87,54                  |
| Dallas (DFW)         | +32,54                 | +97,02                  |
| Los Angeles (LAX)    | +33,56                 | +118,24                 |
| Miami (MIA)          | +25,54                 | +80,17                  |
| New York (JFK)       | +40,38                 | +73,46                  |
| San Francisco (SFO)  | +37,37                 | +122,23                 |
| Washington, DC (IAD) | +38,57                 | +77,27                  |
| Barbados (MKPB)      | +13,04                 | +59,30                  |
| Bermuda (MXKF)       | +32,22                 | +64,41                  |
| Brazil (RIO)         | -22,49                 | +43,15                  |
| London (LHR)         | +51,28                 | +0,27                   |

180 degrees and west is 270 degrees. The bearing identifies the shortest path to the other point over the face of the earth. This path is generally referred to as the great circle route.

Note that it is a quirk of spherical geometry that, with few exceptions, the great circle bearing between two points is almost never simply the opposite direction. The bearing calculated by BEARDI is the great circle heading from the first point to the second. To cal-

culate the bearing from the second point to the first, the data must entered in reverse order.

### USING THE PROGRAM

Latitude and longitude are sometimes coded as fractional degrees but more often either as degrees and minutes or degrees, minutes and seconds. The relationship is very simple. Sixty seconds equal one minute, and 60 minutes equal one degree.

## Financial Decision Making with your TRS-80™ Model 100 Including 18 Programs by Leslie Sparks

ENTREPRENEUR ... EXECUTIVE ...  
BROKER ... BANKER ... BUSINESSMAN ...  
HOME OWNER ... ANYONE WHO WANTS  
TO MAKE HIS MONEY WORK HARDER AND  
TO HAVE BETTER CONTROL OVER HIS  
FINANCIAL FUTURE WILL APPRECIATE  
THIS EXTREMELY WELL-WRITTEN AND  
EMINENTLY PRACTICAL SOURCEBOOK.  
IT'S A HANDS-ON GUIDE TO TRANSFORM-  
ING YOUR TRS-80 MODEL 100 INTO A  
POWERFUL AND RELIABLE ASSISTANT FOR  
FINANCIAL PLANNING AND DECISION-  
MAKING. 144 PP., 96 ILLUS. PAPER-  
BACK. PUBLISHER'S LIST \$9.95 ORDER  
NO. 1799P

TO ORDER, CALL TOLL FREE:  
800-233-1128 (IN PA, HI, OR AL, CALL  
DIRECT: 717-794-2191)



TAB BOOKS Inc.  
P.O. Box 40  
Blue Ridge Summit,  
Pa. 17214

## INVEST BY COMPUTER

### Central Asset Account National Network FREE On-Line Access

Harness your computer's power with UNISAVE

- Deep Discount Brokerage Rates
- Money Market Sweep Account
- Unlimited Check Writing
- Portfolio Accounting
- Open with only \$1,000

Many FREE Computer Services  
FREE Access to View Account  
FREE Entry of Brokerage Orders  
NO Application Fee  
NO Software Purchase Required  
On-Line Investment Research

Data for over 40,000 securities  
Quotes - Stock Performance Ratings  
Research Fees based on connect time

### Discount Stock Commissions

Up to 240 Shares... \$30.00  
241 to 799 Shares... 12 1/2¢ per sh  
800 to 1099 Shares... 10 ¢ per sh  
1100 to 2099 Shares... 8 ¢ per sh  
2100 to 3099 Shares... 7 ¢ per sh  
3100 Shares or More... 5 ¢ per sh

## Call 1-800-UMC-SAVE Unified Management Corporation

Guaranty Building • Indianapolis IN 46204  
MEMBER: Midwest Stock Exchange. NASD SIPC



# 8K RAM \$25 MODULE

**F  
R  
E  
E**

- Ramtest software and
- Prop Legs with order
- Shipping

ULTRA LOW POWER  
Cmos design

Easy step by step  
installation instructions

1 YEAR WARRANTY

MC VISA COD MO ship same day  
\$25 each or 3/\$70

WE SERVICE WHAT WE SELL  
HOBBYIST SPECIAL: Kit form  
all parts except 6264LP \$16

**ECONOMY COMPUTER CONCEPTS**  
Box 2047, N. Babylon, NY 11703

Voice: 516 587 6947  
24 HR MODEM LINE: 669 4764  
300 Baud 7 Bit No Parity

## GPIB



### GPNET model 10

- CPU Z8 Single chip controller (8 MHz)
- ROM 4KB RAM 2KB
- GPIB Controller NEC uPD7210
- RS232C I/O (300-19200bps)
- IEEE-488 bus connector
- GPIB function:
  - SH1 AH1 T6 TE6 L4 LE4
  - SR1 RL2 PPO DC1 DT1
  - C1 C2 C3 C4 C7
- Power Supply: DC.5V 450mA DC 12V 30mA
- 126mm w x 29 mm h x 151 mm l
- 18 oz. weight
- \$350.00

Does not require specific OS  
Only BASIC needed to support network

GPNET 12V Power Unit available

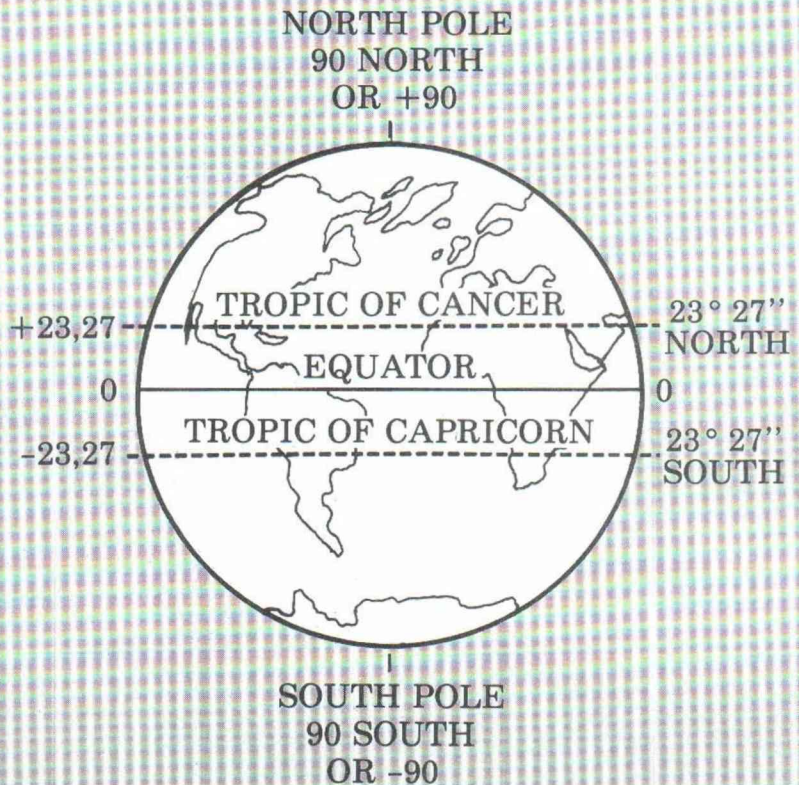
**NICTRIX**  
CORPORATION

Dealer inquiries invited

26 Court Street  
Brooklyn, NY  
718-522-4941

## NAVIGATING

Figure 1.



The BEARDI program prompts for degrees and minutes. Two entries *must* be entered in response to the prompt. If rough calculations are being made, and only degrees are known, you must enter a value of zero for minutes.

You should keep in mind that at the equator one degree equals 60 nautical miles (at sea level). Errors introduced by such rounding could, therefore, be significant. In most cases minutes are available and should be used.

The program doesn't prompt for seconds but they may be included by dividing them by 60 and adding the fraction to the minutes entry. A prompt for seconds could easily be added to the program also. The value entered for seconds must be divided by 3600 and added to the fractional degrees currently calculated by the program.

The program first prompts for the latitude and longitude of the FROM point and then prompts for the coordinates of the TO point. The Model 100 will pause for approximately two seconds after the data are entered before displaying the results.

If you want to use the routine as a subroutine called by an application program delete lines 100 through 250, add a

Return statement at line 800, and from the calling program GOSUB 560 with F1, F2, T3, T4 set to the FROM and TO latitude and longitude, respectively.

### LIMITATIONS

One caution must be noted regarding limitations of the program. Three situations cause a significant error. They are:

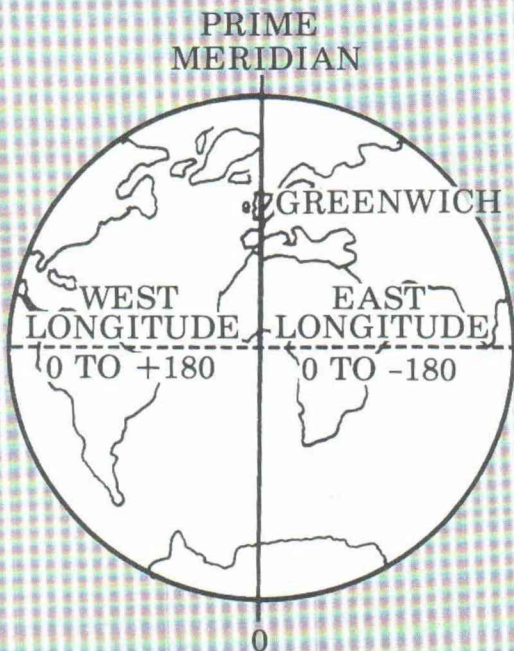
- If the FROM location is one of the poles. The bearing from the North Pole can only be south and from the South Pole, it can only be north. In these two unique cases, adequate information for proceeding from the FROM point to the TO point is not provided.

- If FROM and TO are antipodes — exactly opposite points on the earth's surface. When calculating between antipodes an error of more than a few miles is introduced. However, the distance between antipodes is approximately 12,428.44 statute miles and this error is not likely to be significant. What's more, in a navigation application, if the bearing and distance are again calculated enroute, the error would no longer be present.



# NAVIGATING

Figure 2.



• If the points being measured are extremely close together. One second off represents an error of 88 feet at the equator. In such cases, the error may be only a matter of feet but could represent a significant percentage.

The bearings calculated by the program are with reference to true north (the axis of rotation of the earth). If referencing a magnetic compass, a correction for magnetic deviation must be made. The magnetic North Pole is not exactly at the true North Pole. Also, in a few regions major mineral deposits of ferrous ores cause compasses to be further compromised. To give a few examples, the magnetic deviation in Miami, Florida is one degree west, the deviation in Washington D.C. is nine degrees west, in Dallas, Texas it's seven degrees east and, incredibly, magnetic disturbances as great as 47 degrees exist near the peak of Elk Mountain, Colorado.

General purpose maps do not routinely indicate magnetic deviation. However, virtually all visual aviation and marine maps plot reference lines of variation. When using a map which gives an easterly magnetic variation, subtract that number of degrees from the true bearing calculated by BEARDI.

If the variation is west then add it to the true bearing. By making this correction the actual compass bearing to the destination point is derived.

For applications such as aiming an antenna mounted on a rotor, no complicated corrections need to be made. The rotor should simply be adjusted once, when true north has been determined. However, for vehicles in motion, such as aircraft or ships, the correction for magnetic deviation must be periodically adjusted.

## WHERE TO FIND DATA

In addition to general purpose maps which routinely depict latitude and longitude with some degree of accuracy, the National Ocean Survey publishes several series of both aviation and marine navigation maps of the world. Some of these depict latitude and longitude in considerable detail. Local zoning and planning maps also generally note latitude and longitude. □

*Please help us rate this article's value. If you've found it very valuable, circle 173 on the Reader Service Card. If it was moderately valuable, circle 174—and if it wasn't valuable to you, circle 175.*

## THE GREAT COMMUNICATOR

Work anywhere on your lap-size computer, then transfer files directly to your desk-bound micro. Or use your lap-size as a go-between to move files from one brand of desk computer to another.

All you need is HardWire<sup>®</sup>, the menu-driven program that speeds files between lap-size and microcomputers. Use it with any combination of the NEC 8201/8401, Radio Shack Model 100/200, or Epson Geneva lap computers with the IBM-PC, PC-compatibles, Kaypro, or Otrona Attache. Add a cable and go!

HardWire<sup>®</sup> program and easy-to-follow manual:

only **\$39<sup>95</sup>**

Specify MS-DOS, or Kaypro CP/M  
Or get any two versions for just  
**\$59.95.**

VISA and MasterCard accepted.

To order or for information,  
call or write:

**POMERLEAU COMPUTING  
SYSTEMS of Hyde Park**

P.O. Box 337585  
Chicago, IL 60637 (312) 667-2075

Call us for information  
on other lap-size computers.



- STORE DATA IN OPTIONAL ROM SPACE
- WRITE PERSONAL VERSIONS OF OPERATING SYSTEM
- PROGRAM ADD-ON CAPABILITIES LIKE THE "BIG SYSTEM" HOUSES

|         |   |       |
|---------|---|-------|
| ROM-OPT | Translator Board for option ROM socket to 27C256                            | \$60  |
| ROM-STD | Translator for Standard ROM socket to 27C256                                | \$60  |
| TCJ-28  | Test Clip and Jumper Cable for programming above units from your programmer | \$50  |
| LL-100  | Program the units directly from the M100 System bus socket                  | \$150 |

Prices include taxes, shipping and handling (US only). For faster service use money order or COD.



**TECHNOLOGY FIRST • RADOYLE**

9235 Chesapeake Drive, Suite B  
San Diego, CA 92123

Circle 60 on Reader Service Card



Text processing power that no other program can equal.

# Write ROM<sup>®</sup>

on Snap-in™ Cartridge \$99.

**NOW  
AVAILABLE  
ON  
M-200**

**PCSG says "Send it back in 30 days for a full refund if you don't agree."**

WRITE ROM is the definitive word processing extension for the Model 100. PCSG produced the first text formatter for the Model 100, now sold by Radio Shack as Scripsit 100. Now, 18 months later, PCSG introduced WRITE ROM. Those who have experienced it say WRITE ROM literally doubles the power of the Model 100.

WRITE ROM — as its name implies — is on a snap-in ROM. You simply open the little compartment on the back of the Model 100 with a quarter and press WRITE ROM in. It's as easy as an Atari game cartridge. You can use other ROM programs like Lucid whenever you wish.

WRITE ROM lets you do every formatting function you'd expect, like setting margins, centering, right justifying and creating headers and footers. But it does them under function key control.

WRITE ROM remembers your favorite format settings so you can print a document without any setup, but you can change any formatting or printing parameter instantly with a function key.

WRITE ROM's "pixel mapping" feature shows you an instant picture on the screen of how your printout will look on paper.

In all there are 64 separate features and functions you can do with WRITE ROM, and some of these features are truly breakthroughs for the Model 100.

First, WRITE ROM lets you do search and replace. Any word or phrase in a document can be searched for and replaced with any other phrase where the search words appear.

Second, WRITE ROM lets you send any text (formatted or not) to any other computer over the phone with just a function key. What's more, it dials and handles sign-on and sign-off protocol automatically.

Third, WRITE ROM has a wonderful feature called Library that lets you record favorite phrases, words or commonly used expressions (often called boilerplate).

Any place you wish Library text to appear you just type a code. WRITE ROM automatically inserts the text just like a Xerox Memory Writer. Picture what you can do with that kind of capability.

WRITE ROM is blindingly fast. No one can claim faster operation. Because it is on ROM it uses virtually none of your precious RAM. It works with any printer, serial or parallel. You can make a duplicate copy of a document file under a new filename. Rename or delete (kill) any RAM file with function key ease.

This description only scratches the surface of this amazingly powerful piece of software. Dot commands allow control of such things as margins, centering, line spacing and other changes in the middle of a document. Most are WordStar™ compatible.

A mailmerge feature allows you to send the same document to every name on your mailing list, personalized for each recipient.

WRITE ROM enables you to do underlining, boldface and correspondence mode as well as any other font feature like superscripts that your printer supports, in a way that many users say "is worth the price of the program."

To underline you don't have to remember a complicated printer code. You just type CODE u, and to stop underline, CODE u again. The CODE key is to the right of your spacebar. Boldface? CODE b to start and stop. Easy to remember and do. Five different printer features of your choice.

We couldn't list all the features here. For example, you can select not just double space but triple or any other. You can use your TAB

key in a document. WRITE ROM allows you to indent. This means you can have paragraphs with a first line projecting to the left of the rest of the paragraph. WRITE ROM has a feature unique for any word processor on any computer. It's called FORM. FORM is an interactive mechanism that lets you create screen prompts so that you or someone else can answer them to fill out forms or questionnaires.

With FORM, any place that you had previously typed a GRAPH T and a prompt in a document, WRITE ROM will stop and show you that prompt on the screen. You can type in directly on the screen and when you press F8 you see the next prompt. It goes to a printer or a RAM file.

Think how you can use FORM. A doctor or nurse could use it for a patient's history with each question appearing on the screen. An insurance salesman could use it for his entire questionnaire. You could construct a series of prompts to answer correspondence, typing the answers, even using Library codes. This feature lets you answer letters in rapid-fire fashion, each with personalized or standard responses.

Before WRITE ROM you had to be a programmer to create a series of prompts. Now it's as simple as GRAPH T.

PCSG makes the claim that WRITE ROM is the easiest, fastest and most feature-rich formatter for the Model 100. We're happy to offer WRITE ROM because it expands the 100 to a dimension of text processing you cannot equal on even larger computers.

We brashly state that WRITE ROM is the best you can buy. But put that to the test. If you aren't as excited as we are, return it for a full refund. Priced at \$99. on snap-in ROM. MasterCard, VISA, American Express and COD.

PORTABLE COMPUTER SUPPORT GROUP

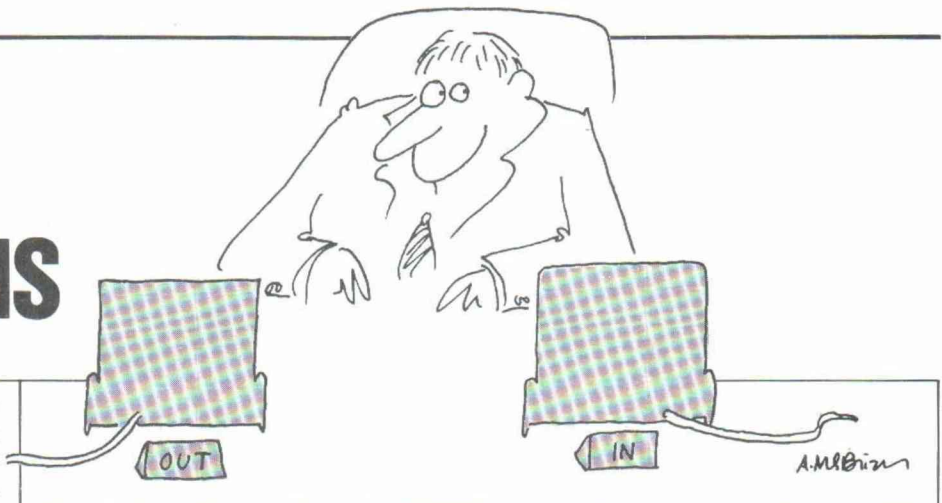
11035 Harry Hines Blvd. No. 207, Dallas, Tx. 75229

VISA / MASTER CARD / AM. EXP. / C.O.D.

**1-214-351-0564**



# EQUIVALENT FUNCTIONS



In the table accompanying Larry Berg's letter "A Basic Comparison" in your September issue, the Model 100 is shown as having no equivalent function for EQV, IMP and MOD.

This is untrue. The table shows NOT(A XOR B), NOT(A OR B) and A-INT(A/B)\*B as "identical functions and parameters." These also work but on experimenting with my Model 100, I found the original commands work equally well with less typing, memory usage and execution time.

Examples of command format:

A MOD B = NOT(A XOR B)

A IMP B = NOT(A OR B)

A MOD B = A-INT(A/B)\*B

My Model 100 has been a constant companion for over a year and I appreciate your magazine very much as a source of information and ideas.

Bruce P. Williams  
Detroit Lakes, MN

## A FUNNY THING HAPPENED WHILE WRITING A PROGRAM

I accidentally created this program trying to accomplish a graphic setup.

Though small, it draws about 119 different graphic kaleidoscope designs using the line-box command.

I thought it might be of some interest to your readers.

```
1 CLS
:FOR Z=1.5 TO 60 STEP .5
2 B=0
:FOR P=1 TO 5
:FOR A=0 TO 32 STEP Z
:X=239-B
:Y=63-A
:GOSUB 7
3 LINE (B,A)-(X,Y),1,B
:B=B+Z
:NEXT A
4 FOR A=32 TO 0 STEP -Z
:X=239-B
:Y=63-A
:GOSUB 7
5 LINE (B,A)-(X,Y),0,B
:B=B+Z
:NEXT A,P,Z
6 END
7 IF X<0 THEN X=0
```

```
8 IF Y<0 THEN Y=0
9 IF X>239 THEN X=239
10 IF Y>63 THEN Y=63
11 IF B>239 THEN B=239
12 RETURN
```

Richard C. Hobbs  
Lisbon Falls, ME

*Thanks for the program. We're only too happy to share it with our readers. However, since some of them out there are Tandy 200 users, we'd like to make an addendum. To take advantage of the full screen on the 200, change the number 32 in lines 2 and 4 to 64 and the 63 in lines 2, 4 and 10 to 127. — Ed.*

## THAT'S NEWS TO US

I've been told by NEC that you publish a monthly newsletter dealing with the NEC 8200 line. I have a NEC 8201A and am interested in seeing a copy of your publication and possibly subscribing if it looks good. Please send information about subscribing and a copy of the newsletter.

H. Noel Thomas  
Seminole, FL

*Camden Communications, Inc. does not publish a NEC specific newsletter at this time. However, Portable 100 magazine reviews and advertises many products that are pertinent to the NEC PC-8201 user. — Ed.*

## USER GROUP NOTES

The Calgary Portable Computer Group has been founded and presently consists of 60 members and is growing. They are actively soliciting information from other user groups as well as product and computer seminars and exhibit information. Anyone involved in promoting the Model 100/Tandy 200, M-10 and NEC portables is invited to contact Craig J. McLay, 41-1011 Canter-

bury Drive S.W., Calgary, Alberta, Canada, (403)238-0990.

Model 100 and Tandy 200 owners who would like to start a users' group in the Detroit area should contact J.R. Cairns, 836 Dover Drive, Dearborn Heights, MI 48127.

The Leesburg (Indiana) BBS has a new telephone number: (219) 594-5843. LBBS can be accessed 24 hours a day, seven days a week.

## PORTABLE NOTEBOOK

I found the article "Take Note" in your September issue interesting and expect that the "code" choices the author has devised are quite useful. When I first became aware of the Model 100's existence, its potential as a portable notebook struck me immediately. Our office is obtaining several for this use.

We have developed a concept for integrating an outliner program into a system (using IBM PCs) which should add considerable power to the organization of notes in a report larger than the Model 100 can handle. Do you know of anyone who has employed an outliner program in this manner and what luck they may have had with it? I hope to be able to try some things soon, but have not had time as yet.

Robert B. Person  
Montana Legislative Council  
Helena, MN

*Funny you should ask. We just received a press release from Traveling Software about Ultimate ROM II (see New Products). This upgraded version of their Ultimate ROM chip includes an improved Idea outline processor which features optional Thinktank file compatibility. This means files created with Thinktank can be converted to run in Idea format and vice versa. It would be something worth looking into. — Ed. □*



# What The Future Holds

Last month we explored compound interest and its effect on investments. This month we expand on that principle and learn what impact interest rates have on such things as annuities and loans.

The following is reprinted from "Financial Decision Making With Your TRS-80 Model 100 Including 18 Programs" by Leslie Sparks (Book No. 1799), with permission of the publisher, Tab Books Inc., Blue Ridge Summit, PA 17214. —Ed.

Although there are many cases where we are interested in lump sum payments, it is more common to be interested in the effects of time on periodic payments. For example, we may want to know how much we will have in five years if we can save \$100 per month. Or we may want to know how much we can withdraw from savings each month if we want the savings to last four years. These are examples of *annuity* problems.

An annuity is defined as a payment (or receipt), usually of a fixed amount, made at stated predetermined intervals.

Most commonly payments are made at the end of the payment period and is called an *ordinary annuity*. If the payment is made at the beginning of the period, the annuity is called an *annuity due*.

We'll look at both types of annuities. Two programs, ANUIT1.BA and ANUIT2.BA are included to provide some solutions to both types of problems.

In order to fix the concept, let's work through an example and then derive the formulas. Suppose we set \$1,000 aside at the end of each year for the next five years. The money will earn 6 percent interest per year compounded annually. How much will we have at the end of the fifth year? At the end of the first year \$1,000 is deposited and earns 6 percent interest for the next year. Also at the end of the second year we deposit the second \$1,000. The value of our account at the end of the second year is \$1,000 (initial deposit) + \$60 (interest on the first \$1,000) + \$1,000 (the second deposit) = \$2,060. At the end of the third year we deposit the third \$1,000 and

so on.

We can use the same example to demonstrate the difference between an ordinary annuity and an annuity due. Remember that ordinary annuity payments are made at the end of the period; payments for an annuity due are made at the beginning or each period. Thus, if our example problem were for an annuity due, we would make the first deposit at the beginning of the first year. At the end of the first year we would have \$1,000 + \$60 (the interest earned). At the end of the second year we would have \$1,000 (the first deposit) + \$60 (the interest earned for first year) + \$1,000 (the second deposit) + \$123.60 (interest earned during the second year on \$2,060).

These two examples show that the difference between an ordinary annuity and an annuity due is one year's worth of interest.

Although it's possible to work any annuity problem this way, it's easier to use annuity formulas. For an annuity due:

(Text continues on page 67)

## Listing 1. Annuity due program ANUIT1.BA.

```
1 REM ANNUITY DUE PROGRAM VERSION 1.0
2 REM FOR TRS-80 MODEL 100 BY LES
3 REM ANUIT1.BA
4 CLEAR
5 DEFINT J,I,L
6 CL$=CHR$(27)+"E"
7 C1$=CHR$(27)+"K"
8 A$="1234567890,+-"
9 AZ$=CHR$(13)+CHR$(31)+CHR$(30)+CHR$(42)+"M"
10 + "m"
11 DIM F$(4),T$(5),X(5)
12 JR=16:
13 JS=2:
14 FOR J=0 TO 4:
15   READ F$(J):
16   NEXT J
17 FOR J=0 TO 4:
18   READ T$(J):
19   NEXT J
20 J=1
21 CLS:
22 JF=0
23 PRINT STRING$(39,"=")
24 PRINT "ANNUITY DUE PROGRAM FOR MODEL 100"
25 PRINT "version 1.0 by LES:"
```

```
26 PRINT "SELECT DESIRED OPTION":
27 PRINT "<F>UTURE VALUE OF ANNUITY,":
28 PRINT "<P>RESENT VALUE OF THE ANNUITY,":
29 :
30 PRINT STRING$(39,"=")
31 PRINT@280,"Please press F OR P. Q QUITs,":
32 Y$=INKEY$:
33 IF Y$="" THEN 90 ELSE J=INSTR("QqFfPp"),Y$)
34 IF J=0 THEN 90
35 IF J < 3 THEN CLS:
36 PRINT:
37 FILES:
38 END
39 IF J>4 THEN GOSUB 900 ELSE GOSUB 500
40 GOTO 50
41 REM CALCULATE FUTURE VALUE
42 CLS
43 T$="CALCULATE FUTURE VALUE OF ANNUITY"
44 T$(4)="FUTURE VALUE"
45 NT=4
46 GOSUB 9000
47 IF Y$="M" OR Y$="m" THEN RETURN
48 PRINT@280,STRING$(39," ");
49 REM FIND MISSING ITEM
50 J9=0
51 FOR J=0 TO NT:
52   IF X(J)=0 THEN J9=J9+1
```





# SOME HISTORIC BREAKTHROUGHS DON'T TAKE AS MUCH EXPLAINING AS COMPUSEVE.

**But then, some historic breakthroughs could only take you from the cave to the tar pits and back again.**

CompuServe, on the other hand, makes a considerably more civilized contribution to life.

It turns the personal computer into something useful.

CompuServe is an information service. Just subscribe, and 24 hours a day, 7 days a week, a universe of information, entertainment and communications is at your service.

**A few of the hundreds of things you can do with CompuServe:**

## COMMUNICATE

**Easyplex™** Electronic Mail puts friends, relatives and business associates in constant, convenient touch.

**CB Simulator** lets thousands of enthusiastic subscribers "chatter away" on 72 different channels.

**Over 100 Forums** welcome you to join their online "discussions." They're for everyone from computer owners and gourmet cooks to physicians and game players.

**Bulletin Boards** let you "post" messages where thousands will see them.

## HAVE FUN

**Our full range of games** includes "You Guessed It!," the first online TV-style game show played for real prizes; Mega-Wars III, the ultimate in interactive excitement; board; parlor; sports and educational games.

## SHOP

**THE ELECTRONIC MALL™** gives you 'round the clock shopping for name brand goods and services at discount prices from nationally known stores and businesses.

## SAVE ON TRIPS

**TWA Travelshopper™** lets you scan schedules and fares, find the best bargains and order tickets online.

**A to Z Travel/News Service** provides latest travel news plus complete information on over 20,000 hotels worldwide.

## MAKE PHI BETA KAPPA

**Grolier's Academic American Encyclopedia's Electronic Edition** is a complete, constantly updated general reference encyclopedia.

**The College Board**, operated by the College Entrance Examination Board, helps you prepare for the SAT, choose a college and get financial aid.

## BE INFORMED

**The AP News Wire** (covering all 50 states and the nation), the Washington Post, USA TODAY Update and business and trade publications are constantly available. And our electronic clipping service lets us find, clip and file specific news for reading at your convenience.

## INVEST WISELY

**Comprehensive Investment Help** includes complete statistics on over 10,000 NYSE, AMEX and OTC securities. Historic trading statistics on over 50,000 stocks, bonds, funds, issues and options. Five years of daily commodity quotes. Standard & Poor's. Value Line. And over a dozen other investment tools.

**Site II** provides demographic and sales potential information by state, county and zip code for the entire country.

## And now for the pleasant surprise.

Although CompuServe makes the most of any computer, it's a remarkable value. You get low start-up costs, low usage charges and local-phone-call access in most major metropolitan areas.

## Here's how to use CompuServe.

CompuServe is "menu-driven," so beginners can simply read the lists of options on their screens and then type in their selections.

Experts can just type in "GO" followed by the abbreviation for whatever topic they're after.

In case of confusion, typing "H" for help brings immediate instructions.

And you can ask general questions either online through our free Feedback service or by phoning our Customer Service Department.

## How to subscribe.

To access CompuServe, you'll need a CompuServe Subscription Kit; a computer, terminal or communicating word processor; a modem and in some cases, easy-to-use communications software.

With your Subscription Kit, you'll receive a \$25 usage credit, a complete hardcover Users Guide, your own exclusive user ID number and preliminary password, and a subscription to CompuServe's monthly magazine, *Online Today*.

Subscription Kits are available in computer stores, electronic equipment outlets, retail stores and catalogs. You can also subscribe with materials you'll find packed right in with many computers and modems sold today.

**Make a move of historic proportions. Subscribe to CompuServe today.**

To receive our free informative brochure or to order direct, call or write:

# CompuServe®

Information Services  
P.O. Box 20212, 5000 Arlington Centre Blvd.  
Columbus, OH 43220

**800-848-8199**

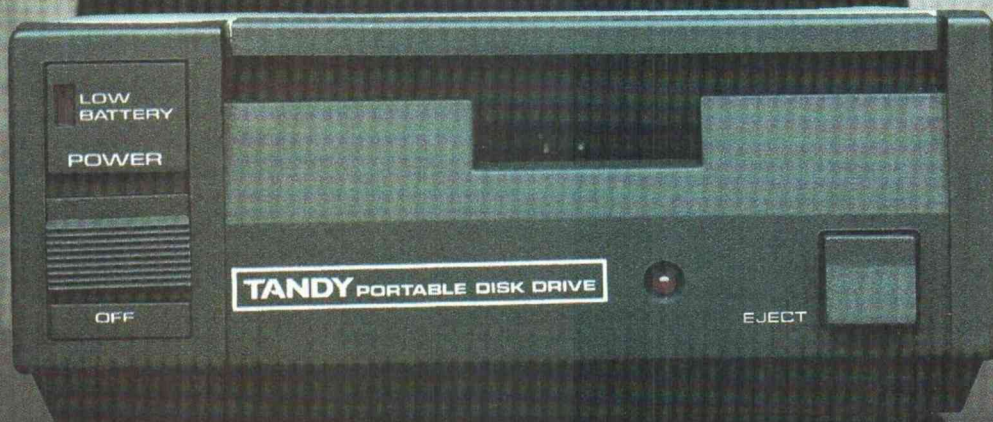
In Ohio, call 614-457-0802





A man in a dark suit, white shirt, and dark tie is holding a tall stack of floppy disks in his left hand and a single floppy disk in his right hand. The floppy disks have a colorful, abstract pattern on their labels. The text "TAKE YOUR PICK." is superimposed over the man's chest.

# TAKE YOUR PICK.



ACTUAL SIZE



# RADIO SHACK'S NEW 100K PORTABLE DISK DRIVE CLEARS UP YOUR CASSETTE CLUTTER



## MEET THE NEW STORAGE SOLUTION

If you're like most Model 100 or Tandy 200 owners, you've probably found more uses for your portable computer than you ever imagined. This is great, but it brings up the question of storage. Where do you keep all those great programs you write? All that important data?

Until today it's probably been on cassettes—a lot of cassettes. And cassettes are cumbersome, bulky and, well . . . slow. Now there's a better way.

Our new Portable Disk Drive (26-3808, \$199.95) gives you fast access to 100,000 characters on 3 1/2" micro floppy diskettes.

## A TRULY PORTABLE DISK SYSTEM

The Portable Disk Drive weighs just 1 3/4 pounds, measures only 2 x 4 15/16 x 6 1/8", and runs on batteries or optional AC adapter. It's small enough to fit into a briefcase along with your Model 100 or Tandy 200. Now you can have a full-fledged disk system wherever you go. Initialization software included.

It's perfect for use with your portable's built-in software. Now you can store and update large documents with TEXT word processing and keep easy-to-store micro disks filed and categorized as you need them.

Or, if you have the Tandy 200 with built-in Multiplan spreadsheet analysis (or the Multiplan or Interactive Solutions ROM packs for the Model 100), it's easy to keep many different spreadsheets on diskette for comparison and update.

## REAL DISK DRIVE POWER

The Portable Disk Drive features easy menu-driven operation. The operating system lets you list the files on the diskette, and features FORMAT, SAVE, LOAD, KILL and RENAME functions. A disk access lamp lets you know that the disk is in use. Another indicator tells you when batteries are low. If they are, the unit will not function, but will finish a job in progress.

## SPEED, SIMPLICITY, FLEXIBILITY

Now you can build your software and data library in a cost-effective manner. The micro diskettes are only \$16.95 (package of 3), and cost even less when you buy in quantity. The choice is yours—but we've already stacked the deck. Step up to reasonable storage today!

**Radio Shack®**  
**COMPUTER CENTERS**

A DIVISION OF TANDY CORPORATION  
Circle 47 on Reader Service Card

**New 1986 Computer Catalog!**  
Send me a copy.

Mail To: Radio Shack, Dept. 86-A-907  
300 One Tandy Center, Ft. Worth, TX 76102

Name \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Telephone \_\_\_\_\_

Portable Disk Drive available Nov. 30, 1985.  
Prices apply at Radio Shack Computer Centers  
and at participating stores and dealers.  
Multiplan/TM Microsoft Corp.

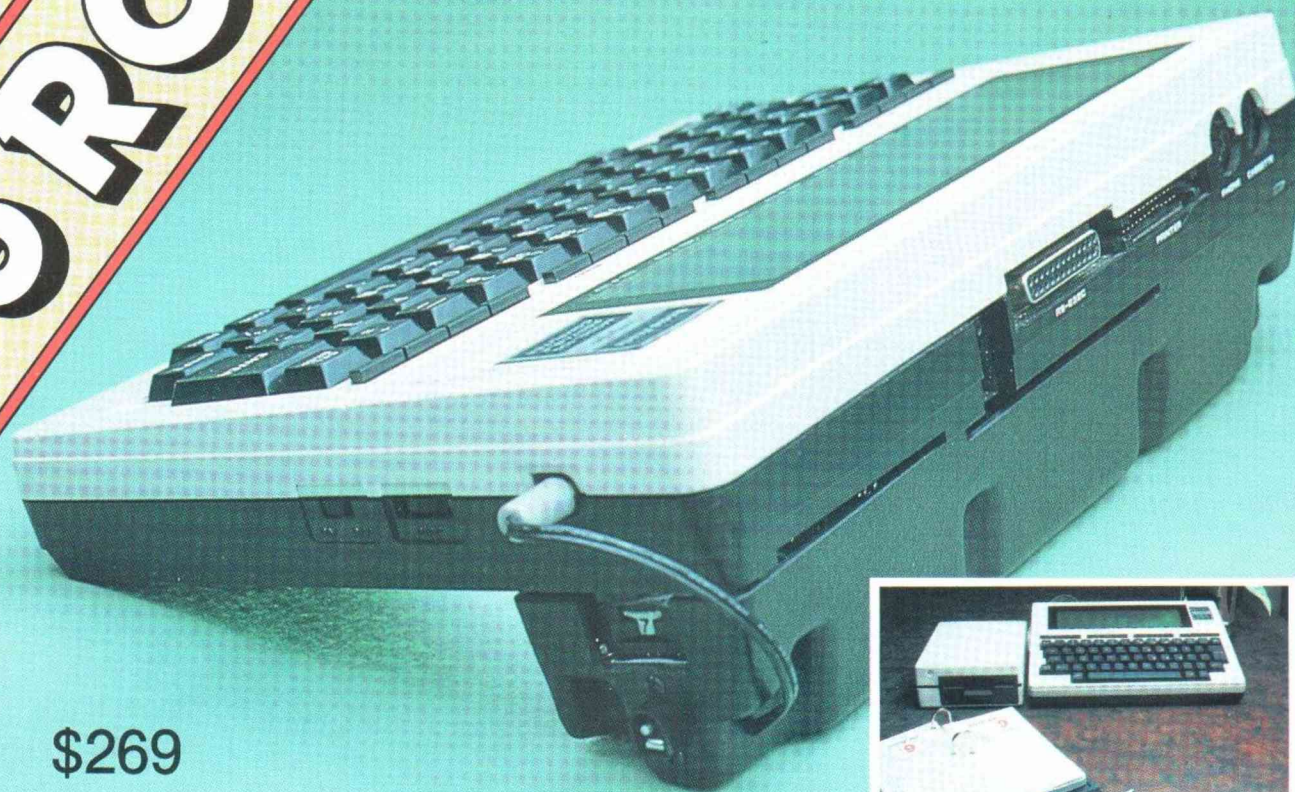


# 6 ROM

# BANK

*plus powerful Nicad battery pack that gives 30 hours of power to your Model 100*

NOW  
AVAILABLE  
ON  
M-200



**\$269**

A joint PCSG/CRYPTRONICS project.



**Now you can access LUCID, DISK +, WRITE ROM, RAM + and others instantly.**

The 6 ROM BANK plus battery pack lets you have the ultimate Model 100 system. When you get your unit just press in up to 6 ROMs into the sockets then push in a simple plug into your Model 100's ROM socket. The ROM bank has two posts on either end that insert into the two little holes on the underside of your Model 100.

The ROM bank props up the Model 100 at the same angle and height as those little legs you've seen. The ROM BANK itself is only about 1½" deep and it runs the width of your Model 100. It only weighs one pound. It not only installs instantly, but it pops free in a second if you need everything to lie flat in a briefcase.

**Change from ROM to ROM with the touch of a thumb switch.**

You can go from LUCID to WRITE to DISK + to any other ROMs just by turning the thumb switch at the side of the ROM bank. The 6 ROM BANK is a sturdy well built construction that looks like it is a part of your Model 100.

What is also fantastic is that the ROM bank has a powerful NICAD battery and recharger built right in. This power source supplies up to 30 hours of life to your Model 100 with just 6 hours of recharge. What's nice is that it recharges right from your Model 100's power adapter. This is a quick charge system and if you need power in a hurry, you can get 6 hours of life for your Model 100 by just charging for an hour and half.

**Suddenly, the Model 100 is a very powerful computer.**

If you have the HOLMES portable disk drive with its powerful bundled database software package or the CRYPTRONICS 128K RAM expansion along with LUCID, WRITE ROM and DISK + in the 6 ROM bank with its rapid rechargeable NICAD power source, you have the ultimate portable system. It's all available only from PCSG.

As usual we don't want you to take our word for it. The 6 ROM BANK is sold on a 30 day trial. If you are not satisfied simply return within thirty days for a full refund. MC, VISA, AM. EX. or C.O.D.

**1-214-351-0564**

PORTABLE COMPUTER SUPPORT GROUP

11035 Harry Hines Blvd. No. 207, Dallas, Tx. 75229

VISA / MASTER CARD / AM. EXP. / C.O.D.

Circle 32 on Reader Service Card



## ANNUITIES (from page 62)

```

574 NEXT J
576 IF J9>1 THEN CLS:
PRINT " ERROR. TOO MANY UNKNOWN.":
FOR J=0 TO 500:
NEXT J:
GOTO 550
578 J=0
580 IF X(J)=0 THEN N600 ELSE J=J+1
590 IF J>N THEN CLS:
PRINT "YOU SPECIFIED EVERYTHING. ERROR.":
FOR J=1 TO 400:
NEXT J:
GOTO 550
595 GOTO 580
600 JS=J+2:
LC=0:
ON J GOTO 630,640,660,680
605 PRINT @280, " FINDING INTEREST RATE.":
610 R=.15/X(2):
RL=0:
RB=1/X(2)
612 E1=(1+R)^(X(2)*X(1)):
C1=X(3)*(E1-1)
615 R1=(1+R)*C1/X(4)
620 IF ABS((R-R1)/R)<.00001 THEN 628
624 IF LC>15 THEN CLS:
PRINT " ERROR WILL NOT CONVERGE":
PRINT " TRY AGAIN":
FOR J=0 TO 500:
NEXT J:
GOTO 550
625 LC=LC+1:
IF R>R1 THEN RL=RELSE RB=R
626 R=(RL+RB)/2:
GOTO 612
628 X(0)=R*100*X(2):
X(0)=INT(1000*X(0))/1000:
GOTO 550
630 PRINT @280, "CALCLATING NO. OF YRS.":
R=X(0)/100/X(2):
R1=1+R:
V=X(4)/X(3)
632 C=V*R/R1+1:
X(1)=LOG(C)/LOG(R1)/X(2)
638 GOTO 550
640 PRINT @280, "FINDING NR. OF PERIODS/YR.":
LC=0:
N=1:
642 R=X(0)/100/N:
R1=1+R:
V=X(4)/X(3):
C=V*R/R1+1
644 XN=LOG(C)/LOG(R1)/X(1)
646 IF ABS(XN-N)/N<.001 THEN N650
648 N=XN:
LC=LC+1:
IF LC>16 THEN N655 ELSE 642
650 IF XN<1 THEN 657 ELSE X(2)=INT(XN+.5):
GOTO 550 LIST 657
655 CLS:
PRINT "ERROR. ERROR.":
656 PRINT "DID NOT CONVERGE. TRY NEW INPUT.":
FOR J=0 TO 500:
NEXT J:
GOTO 550
657 CLS:
PRINT "ERROR ERROR. ":
PRINT "LESS THAN ONE PAYMENT/YR.":
FOR J=0 TO 700:
NEXT J:
GOTO 550
660 PRINT @280, "CALCULATING AMT OF PAYMENT.":
R=X(0)/100/X(2)
665 X(3)=X(4)/(1+R)/((1+R)^(X(2)*X(1))-1)*R
670 GOTO 550
680 PRINT @280, "CALCULATING FUTURE VALUE.":
R=X(0)/100/X(2)
690 X(4)=X(3)*(1+R)*((1+R)^(X(2)*X(1))-1)/R
695 GOTO 550
900 CLS:
T$="CALCULATE PRESENT VALUE OF ANNUITY."
910 T$(4)="PRESENTVALUE":
NT=4:
JS=2
920 GOSUB 9000
922 IF Y$="M" OR Y$="m" THEN RETURN
925 PRINT @280, STRING$(39, " ");
930 J9=0
940 FOR J=0 TO NT:
IF X(J)=0 THEN J9=J9+1

```

$$FV1 = S[(1 + r)^n - 1][1 + r]$$

where FV1 is the future value of the annuity due (a lump sum), S is the amount of the payment, r is the interest rate per period and n is the number of periods. The equation for the present value of an annuity due is:

$$PV1 = S[(1 + r)^n][1 + r]$$

where PV1 is the present value of the annuity due. This equation says that if we set aside PV1 dollars now at an interest rate of r per period, we can withdraw S dollars per period for n periods.

The equation for an ordinary annuity are:

$$FV = S \frac{(1 + r)^n - 1}{r}$$

where FV is the future value of the ordinary annuity and all the other terms are as defined for the annuity due. The present value of an ordinary annuity is given by:

$$PV = S \frac{1 - (1 + r)^{-n}}{r}$$

where PV is the present value of an ordinary annuity.

There are two types of annuity problems. The first is the future value problem, which (obviously) uses the future value formulas for solution. The future value problem involves a lump sum that you'll receive in the future, provided that you set aside a given sum at regular intervals. Generally, you either know

the lump sum you need and want to know what the regular savings have to be, or you know how much you are setting aside and want to know the value of the lump sum.

The other general problem is the present value problem. In this case you have a lump sum now and want to receive it in the form of regular payments for some time in the future. To solve this type of problem, you use the present value formulas.

Quite often we are interested in both type of problems at the same time. A retirement fund is an example of a case where we may have both a present value and a future value problem: as long as

(Text continues on page 74)



## ANNUITIES

```

950 NEXTJ
960 IF J>1 THEN CLS:
PRINT:
PRINT " ERROR ERROR.":
PRINT " TOO MANY UNKNOWN.":
FOR J=0 TO 500:
NEXTJ:
GOTO 920
970 J=0
980 IF X(J)=0 THEN 1010 ELSE J=J+1
990 IF J>NT THEN CLS:
PRINT " ERROR. YOUR SPECIFIED EVERYTHING.":
PRINT " TRY AGAIN.":
FOR J=0 TO 500:
NEXTJ:
GOTO 920
1000 GOTO 980
1010 JS=J+2:
ON J GOTO 1100,1200,1300,1400
1019 PRINT@280,"FINDING INTEREST RATE.":
1020 REM FIND INTEREST RATE
1022 RL=0:
RB=2.0/X(2):
R=0.12*NOTE LIMITS MAX INTEREST RATE
1024 R1=.12/X(2):
LC=0:
C=X(4)/X(3)
1026 E1=(1-(1+R1)^(X(1)*X(2)))/R1
1030 R=C/E1-1

```

```

1034 LC=LC+1
1036 IF ABS(R-R1)/R1<.001 THEN 1042
1038 IF LC>28 THEN CLS:
PRINT "ERROR. ERROR.":
PRINT " DID NOT CONVERGE TRY NEW DATA.":
FOR J=0 TO 500:
NEXTJ:
GOTO 920
1039 IFR>R1 THEN RB=R1 ELSE RL=R1
1040 R1=(RL+RB)/2:
GOTO 1026
1042 X(0)=R1*100*X(2):
GOTO 920
1100 PRINT@280,"calculate no of years.":
1110 R=X(0)/100/X(2)
1120 C=X(4)/(X(3)*(1+R))*R
1122 IF C>=1 THEN CLS:
PRINT "MONEY WILL LAST FOREVER @ THIS RATE.":
FOR J=0 TO 700:
NEXTJ:
X(1)=9999999999:
GOTO 920
1130 X(1)=-1*LOG(1-C)/(X(2)*LOG(1+R))
1140 GOTO 920
1200 PRINT@280," CALCULATE NO OF PERIODS/YR."
1201 LC=0
1210 N1=6:

```

## PORTABILITY



**\$59.95**

(Add \$2.50  
shipping & handling  
per case in the  
continental U.S.,  
Alaska & Hawaii  
add \$3.50)

## MADE COMPLETE

The Chip-Tote™ PCD-1 makes your TRS-80 Model 100, 200 or comparably sized briefcase portable truly complete. It's the first light-weight soft case that doubles as a desk.

The Chip-Tote™ PCD-1 is constructed of rugged Cordura® nylon and our special closed cell foam, so you can be sure your computer and its accessories will get the maximum in protection. So next time don't leave the office behind — carry it with you!

YES, send me: \_\_\_\_\_ PCD-1(s) in \_\_\_\_\_ Black \_\_\_\_\_ Smoke Grey

Name \_\_\_\_\_ Phone (\_\_\_\_) \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Signature \_\_\_\_\_

☐ CHECK/MO (CA res. add 6% tax) ☐ C.O.D. (Add \$1.65)

☐ M/C ☐ VISA \_\_\_\_\_ Exp. \_\_\_\_\_



KANGAROO VIDEO PRODUCTS, INC.  
10845 Wheatlands Ave., Suite "C" • Santee, CA 92071-2856 • (619) 562-9696  
ENGINEERED CASES FOR SENSITIVE ELECTRONIC EQUIPMENT

Circle 24 on Reader Service Card

## PROMPTTEXT, The Prompted Text Writer

**PROMPTTEXT** — for Radio Shack Model 100 users who do repetitive information gathering — the kind requiring standard headings or data field labels that go into the file always in the same order. It's for any standardized data gathering — surveys, logs, medical records, scientific measurements, diaries, customer info — you name it.

**PROMPTTEXT** eliminates the tedium of typing headings or field labels over and over again in TEXT mode and the possibility of forgetting something. The program supplies prompts you have previously created. Each time you enter your response, both the prompt and the response are stored in the destination file. The stored prompts provide convenient "handles" for data retrieval and data processing.

A single keystroke then takes you directly into TEXT mode so you can add comments or make changes. Three keystrokes take you back to PROMPTTEXT to continue. Other single keystrokes give you such handy information as the time and the amount of memory left. And one keystroke takes you into TELCOM to upload your file to another computer.

How much is it? Only \$39.95 plus \$3.00 for handling and postage, check or money order.

**Life Sciences Editorial Software**  
3604 Bel Pre Road  
Silver Spring, Maryland 20906  
(301) 949-4226

Circle 18 on Reader Service Card



## ANNUITIES

```

R=X(0)/100
1212 R1=R/N1:
C=X(4)/(X(3)*(1+R1))*R1
1214 IF C>=1 THEN N1=N1*2:
GOTO1212
1220 R1=R/N1:
C=X(4)/(X(3)*(1+R1))*R1
1225 IF C>=1 THEN LC=LC+1:
N1=N1+1:
IF LC>22 THEN 1244 ELSE 1220
1230 N2=-1*LOG(1-C)/(X(1)*LOG(1+R1))
1235 LC=LC+1
1240 IF ABS(N2-N1)/N1<0.005 THEN 1250 ELSE N1=(N2
+N1)/2
1244 IF LC>20 THEN CLS:
PRINT" ERROR ERROR":
PRINT"DID NOT CONVERGE AFTER ";LC:
FOR J=0 TO 600:
NEXT J:
GOTO 920
1245 GOTO 1220
1250 X(2)=INT(N2+.5):
GOTO 920
1300 PRINT@280,"CALCULATING AMOUNT OF PAYMENT.
";
R=X(0)/100/X(2)
1310 X(3)=X(4)*R/((1-(1+R)^-(X(2)*X(1))))/(1+R)
1320 GOTO 920
1400 PRINT@280,"CALCULATING PRESENT VALUE.":

```

```

R=X(0)/100/X(2):
R1=(1+R)^-(X(1)*X(2))
1410 X(4)=X(3)/R*(1+R)*(1-R1)
1420 GOTO 920
9000 REM DATA INPUT
9001 REM (C) 1983 L.E. SPARKS
9002 REM MAY BE FREELY USED
9010 CLS
9015 PRINT T$
9020 PRINT STRING$(39,"=")
9040 FOR J=0 TO NT
9050 PRINTTAB(2) T$(J);TAB(21):
PRINTUSINGF$(J);X(J)
9060 NEXT J
9065 IF JQ=-9 THEN 9800
9070 PRINT @ (JS*40)+JR,"->";
9075 PRINT@280,"ARROWS MOVE ->, * CALCULATES M
RETURNS";
9080 Y$=INKEY$:
IFY$="" THEN 9080
9090 IF INSTR(A$,Y$)<>0 THEN 9500
9095 IF Y$="M" OR Y$="m" THEN JF=-9:
RETURN
9100 JZ=INSTR(AZ$,Y$):
IF JZ=0 THEN 9080
9110 ON JZ GOTO 9120,9120,9140,9250
9120 PRINT@ (40*JS)+JR," ";
9122 JS=JS+1:
IF JS>NT+2 THEN JS=2

```

## FX/RX Owners

THIS  
(Draft Print)



or THIS  
(NLQ Print)  
(5 x size)



Install our new LetterWriter NLQ upgrade kit in your printer and you can choose NLQ (or any of 15 other print features) by simply tapping your printer panel buttons. NLQ print has four times the resolution of draft print. That means finer character detail, no visible dots, and impressive-looking documents. The FX version even adds IBM Graphics printer compatibility. With LetterWriter in your FX or RX, you may never need to buy a letter quality printer. Why not get LetterWriter for your printer today?

NLQ 12345678901234567890  
Draft 12345678901234567890



FINGER  
PRINT™  
**LetterWriter™**  
NLQ Upgrade Kit  
by:

Dresselhaus Computer Products, Glendora, CA  
Call (818) 914-5831 for dealer nearest you.

**\$79.95 \$59.95**  
FX RX

For all FX-80/100 and RX-80/100  
printers including F/T and + series.  
Simple plug-in installation.  
Complete instructions included.

## TRS-80™

SAVE SALES TAX \*PLUS DISCOUNT  
\*TEXAS RESIDENTS ADD ONLY 4 1/2%



TANDY 200-72K

**FORT WORTH COMPUTERS**

WE ARE SERIOUS ABOUT SAVING YOU MONEY

(Located 30 miles from Fort Worth)

377 PLAZA • GRANBURY • NR FORT WORTH, TEXAS 76048

**CALL FREE: 1-800-433-S-A-V-E**

Monday thru Friday - 9:00 a.m. to 5:00 p.m.

(Order inquiries/Customer Service &) IN TEXAS: 817-573-4111

Circle 30 on Reader Service Card

Circle 20 on Reader Service Card







## ANNUITIES

```

16 FORJ=0TO4:
  READT$(J):
  NEXTJ
40 J=1
50 CLS:
  JF=0
60 PRINT STRING$(39,"=")
70 PRINT "ORDINARY ANNUITY PROGRAM FOR MODEL
  100"
72 PRINT "  version 1.0 by LBS."
80 PRINT"  SELECT DESIRED OPTION":
  PRINT" <F>UTURE VALUE OF ANNUITY.":
  PRINT" <P>RESENT VALUE OF THE ANNUITY."
85 :
  PRINTSTRING$(39,"=")
86 PRINT@280,"Please press F OR P. Q QUITs.":
90 Y$=INKEY$:
  IFY$=""THEN90ELSEJ=INSTR("QqFfPp",Y$)
92 IF J=0THEN90
95 IF J < 3 THEN CLS:
  PRINT:
  FILES:
  END
100 IFJ>4THENGOSUB 900 ELSE GOSUB 500
110 GOTO 50
500 REM CALCULATE FUTURE VALUE
505 CLS
510 T$="CALCULATE FUTURE VALUE OF ANNUITY"

```

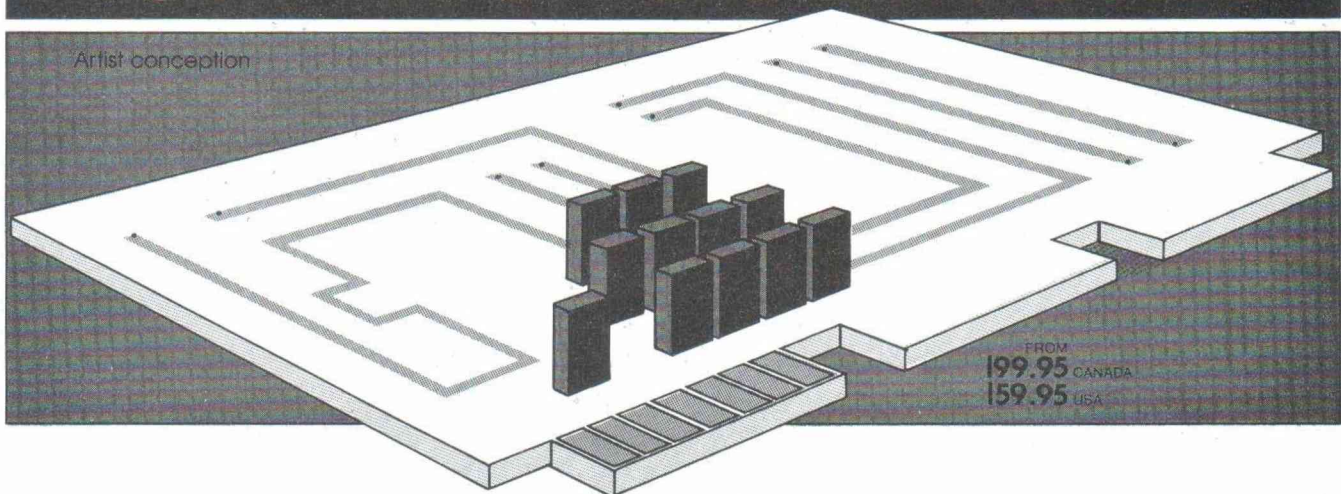
```

520 T$(4)="FUTURE VALUE"
540 NT=4
550 GOSUB 9000
552 IFY$="M"ORY$="m" THEN RETURN
555 PRINT@280,STRING$(39," ");
560 REM FIND MISSING ITEM
570 J9=0
572 FORJ=0TONT:
  IFX(J)=0THEN J9=J9+1
574 NEXTJ
576 IFJ9>1THENCLS:
  PRINT" ERROR. TOO MANY UNKNOWNs.":
  FORJ=0TO500:
  NEXTJ:
  GOTO550
578 J=0
580 IFX(J)=0THEN600ELSEJ=J+1
590 IFJ>NTTHENCLS:
  PRINT"YOU SPECIFIED EVERYTHING. ERROR.":
  FORJ=1TO400:
  NEXTJ:
  GOTO550
595 GOTO 580
600 JS=J+2:
  LC=0:
  ONJGOTO630,640,660,680
605 PRINT@280," FINDING INTEREST RATE.":
610 R=.15/X(2):
  RL=0:

```

# CONTROL YOUR WORLD

Artist conception



FROM  
199.95 CANADA  
159.95 USA

**Let your Tandy 100 and our interface board harness your environment. Features user definable jumpers, gold card edge connectors and standard generic parts throughout.**

**RAINBOW COMPUTERS 8409 ELBOW DR. CALGARY, ALBERTA T2V 1K8 (403) 253-6142**



Farmers can control their grain production in minutes by keying in their instructions.



Homeowners can safeguard their homes by controlling electricity whether they're in or out.



Let your imagination be your guide.



## ANNUITIES

```

RB=1/X(2)
612 E1=(1+R)^(X(2)*X(1)):
C1=X(3)*(E1-1)
615 R1=C1/X(4)
620 IF ABS(R-R1)/R<.00001 THEN 628
624 IF LC>15 THEN CLS:
PRINT" ERROR WILL NOT CONVERGE":
PRINT" TRY AGAIN":
FORJ=0TO500:
NEXTJ:
GOTO550
625 LC=LC+1:
IFR>R1 THEN R1=R ELSE R=R
626 R=(R1+R)/2:
GOTO612
628 X(0)=R*100*X(2):
X(0)=INT(1000*X(0))/1000:
GOTO550
630 PRINT@280,"CALCULATING NO. OF YRS.":
R=X(0)/100/X(2):
R1=1+R:
V=X(4)/X(3)
632 C=1+V*R:
X(1)=LOG(C)/LOG(R1)/X(2)
638 GOTO 550
640 PRINT@280,"FINDING NR. OF PERIODS/YR.":
LC=0:
N=1:
642 R=X(0)/100/N:

```

```

R1=1+R:
V=X(4)/X(3):
C=1+V*R
644 XN=LOG(C)/LOG(R1)/X(1)
646 IF ABS(XN-N)/N<.001 THEN 650
648 N=XN:
LC=LC+1:
IFLC>16 THEN 655 ELSE 642
650 IF XN<1 THEN 657 ELSE X(2)=INT(XN+.5):
GOTO550 LIST 657
655 CLS:
PRINT"ERROR. ERROR."
656 PRINT "DID NOT CONVERGE. TRY NEW INPUT.":
FORJ=0TO500:
NEXTJ:
GOTO550
657 CLS:
PRINT"ERROR ERROR. ":
PRINT"LESS THAN ONE PAYMENT/YR.":
FORJ=0TO700:
NEXTJ:
GOTO550
660 PRINT@280,"CALCULATING AMT OF PAYMENT.":
R=X(0)/100/X(2)
665 X(3)=X(4)/(1+R)/((1+R)^(X(2)*X(1))-1)*R
670 GOTO 550
680 PRINT@280,"CALCULATING FUTURE VALUE.":
R=X(0)/100/X(2)
690 X(4)=X(3)*((1+R)^(X(2)*X(1))-1)/R

```

**ANNOUNCING  
the NEW**

**\$699<sup>00</sup>**

## Portable Micro Floppy PFD 400

### Specifications:

- 3.5 inch Disk Drive
- Single Sided/Double Density
- 360 KB Formatted
- Up to 5 Hours Operation using built-in rechargeable Ni-Cad Batteries
- Operate or recharge using your computer's AC adapter Will NOT tie up Centronics/RS232 Ports
- 40 or 80 Columns by 25 Lines on a Video Monitor

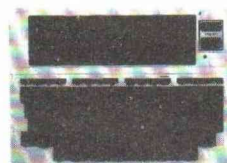
Software and Hardware for  
M 100, M10, PX-8, HX-20  
Video Interface for HX-20 and PX-8

**80 Columns!**



80 x 25  
40 x 25

**Tandy M 100**



**Olivetti M 10**



**TRULY Portable**



Less than  
7 1/2 x 3 x 5 1/3 inches

**CALL NOW (214) 985-0968**

Developed and Produced By

**time-software**

Distributor for USA and Canada: McDonald Micro Products  
14902 Preston Road, Suite 212-239  
Dallas, Texas 75240

Design and Specifications are subject to change without notice.



# ANNUITIES

```

695 GOTO 550
900 CLS:
  T$="CALCULATE PRESENT VALUE OF ANNUITY."
910 T$(4)="PRESENT VALUE":
  NT=4:
  JS=2
920 GOSUB 9000
922 IF Y$="M" OR Y$="m" THEN RETURN
925 PRINT@280,STRING$(39," ");
930 J9=0
940 FOR J=0 TO NT:
  IF X(J)=0 THEN J9=J9+1
950 NEXT J
960 IF J9>1 THEN CLS:
  PRINT:
  PRINT"  ERROR ERROR.":
  PRINT"  TOO MANY UNKNOWN.":
  FOR J=0 TO 500:
  NEXT J:
  GOTO 920
970 J=0
980 IF X(J)=0 THEN 1010 ELSE J=J+1
990 IF J>NT THEN CLS:
  PRINT"  ERROR. YOUR SPECIFIED EVERYTHING.":
  PRINT"  TRY AGAIN.":
  FOR J=0 TO 500:
  NEXT J:
  GOTO 920

```

```

1000 GOTO 980
1010 JS=J+2:
  ON J GOTO 1100,1200,1300,1400
1019 PRINT@280,"FINDING INTEREST RATE.":
1020 REM FIND INTEREST RATE
1022 RL=0:
  RB=2.0/X(2):
  R=0.12*NOTE LIMITS MAX INTEREST RATE
1024 R1=.12/X(2):
  LC=0:
  C=X(3)/X(4)
1026 E1=(1-(1+R1)^(X(1)*X(2)))
1030 R=C/E1
1034 LC=LC+1
1036 IF ABS(R-R1)/R1<.0001 THEN 1042
1038 IF LC>38 THEN CLS:
  PRINT"  ERROR. ERROR.":
  PRINT"  DID NOT CONVERGE TRY NEW DATA.":
  FOR J=0 TO 500:
  NEXT J:
  GOTO 920
1039 R1=R
1040 GOTO 1026
1042 X(0)=R1*100*X(2):
  GOTO 920
1100 PRINT@280,"calculate no of years.":
1110 R=X(0)/100/X(2)
1120 C=X(4)/(X(3))*R

```

(Listing continues on page 76)

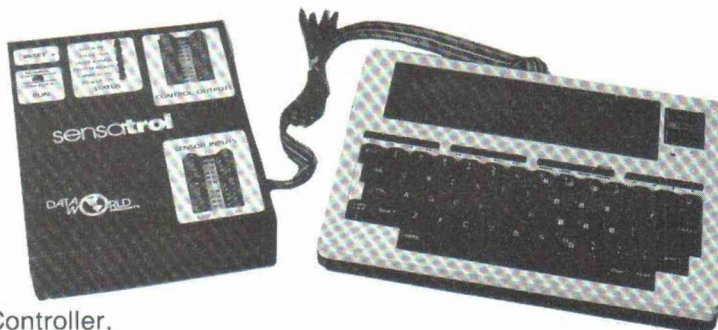
# MEASUREMENT & CONTROL

INTERFACE WITH MODEL 100 SOFTWARE

**MEASURE**  
VOLTAGE  
SPEED  
LIGHT  
TEMP

**CONTROL**  
ALARMS  
MOTORS  
LIGHTS  
HEATERS

and hundreds of others



## • RS 232C VOLTMETER •

8 Channel, 4½ Digit, AC/DC Voltmeter & Controller, **SENSATROL** talks your computer's language! Sensors hook up easily to differential inputs with 100 uV resolution (15 bits). Special RS 232C tri-state serial output allows networking. Includes seven binary control outputs. Uses simple **Print** and **Input** with Basic. Detailed manual guides users in sensor hookup & applications. 9-12V DC operation.

**MODEL 412 — \$385.00**

## • SOFTWARE •

**FOR MODEL 100/200**

**DATA LOGGER/CONTROLLER — \$75.00**

- Data logging on timer
- Sensor calibration routine
- Thermostat control routine
- Screen and printer graphics
- X-Y plotter graphics routine
- Data upload on RS 232C or modem

**DATA**  
**WORLD**  
**PRODUCTS**

PO BOX 33  
FRANCESTOWN, NH  
03043  
603-588-3746



# STILL HUNGRY?



## LISTINGS, HERE! HEY, GET YOUR LISTINGS!

Spicy programs pepper the world of Tandy portable users . . . more than can be included in the pages of Portable 100/200 magazine. The magazine will continue to include listings—and for those with heightened cravings, the Editors are pleased to offer a monthly supplement of rich desserts.

The Portable Program Review will tempt you each month with a more-ish diet; more listings to run on the Model 100, Tandy 200 and NEC . . . more games . . . more utilities . . . more graphics . . . and home-cooked favorites.

Popular *pièces de resistance* from former issues will be brought back to savor. And all offerings, old and new, will be served by the Portable 100/200 magazine's technical staff who will be on hand to answer your questions.

Your 12-issue newsletter subscription will enhance the benefits of both a valuable magazine and computer .

So if you feel the need to snack between meals, supplement your Portable 100/200 appetite with The Portable Program Review. Here's how to make the newsletter's next seating:

1. Locate the Portable 100/200 Reader Service Card in this issue.
2. Check the letter for The Portable Program Review newsletter.
3. Enclose the card with your check or money order in the amount of \$29.97 for One Year (12 issues) of The Portable Program Review newsletter. Or you may pay by MasterCard or Visa. (Please be sure to include the card number and expiration date.)

Bon Appétit

## ANNUITIES (from page 67)

we are paying into the fund, we have a future value problem, but if we want to know how much to withdraw from the retirement fund, we have a present value problem. The two programs ANUIT1.BA and ANUIT2.BA can be used to solve both the present value and future value problems. ANUIT1.BA is for annuity due problems, ANUIT2.BA is for ordinary annuity problems. The two programs require the same information to run.

Because ordinary annuities are more common, the remaining discussion will cover ANUIT2.BA

As soon as you run ANUIT2.BA you see the display shown in Figure 1. The

Figure 1: Introductory display for ordinary annuity program.

```
=====
ORDINARY ANNUITY PROGRAM FOR MODEL 100
version 1.0 by LES.
SELECT DESIRED OPTION
<F>UTURE VALUE OF ANNUITY.
<P>RESENT VALUE OF THE ANNUITY.
=====
Please press F OR P. Q QUITs.
```

program needs to know if you are working a future or present value problem. Answer the question by typing P for present or F for future. If you want to quit and return to BASIC, press Q. If you type any other key, the program will reject your answer, ask you to press either F, P or Q and then wait for your response.

As soon as you answer the question, the computer displays the data entry form (Figure 2). You move from item to

Figure 2: Annuity data entry form.

```
CALCULATE FUTURE VALUE OF ANNUITY
=====
INTEREST  ->  0.000%
NUMBER YRS  0.00
NPERIOD/YR   0
AMT PAYMENT          $0.00
FUTURE VALUE        $0.00
ARROWS MOVE ->, * CALCULATES M RETURNS
```

item by pressing the up and down arrow keys. You can also move to the next item by hitting the Return key.

Enter the data for the items you know and enter zero for the item you wish to solve. As soon as all the data is entered, press the \* key to start calculations. If you entered zero for more than one item, an error message will be displayed and you'll be returned to the data entry form to fill in the missing information. If you entered data for all the items, another error message appears and you'll be returned to enter a zero in the appropriate place. While the program is calculating the answer, it displays the item that it's calculating.



## ANNUITIES

When the calculations are complete, the answer is printed on the screen. If you want to send the results to a printer, simply hit the Print key. The advantage to doing the print this way is that all the input data and the answer are shown. Some time later you'll be able to figure out what problem you were working on and not have to depend on remembering the data.

If you wish to do additional calculations, simply enter new data. If you want to quit or you want to work on a different type of annuity problem, press M and you'll be returned to the first menu.

## LOANS

Many loans are a form of annuity. Mortgages, car loans and other loans where regular payments of principal and interest are made to pay off the loan can all be defined as such. The program LOAN.BA is designed to calculate the amount of the payment, and if you want, to print out a payment schedule that shows how much of each payment goes to interest and principal and the remaining balance. (This program provides explicit line printer output.) The data entry form is shown in Figure 3.

Figure 3: Data entry form for loan calculation.

### LOAN CALCULATOR PROGRAM BY LES

```
=====
ANTLOAN  ->    $0.00
INTEREST    0.000%
PAYMTS/YR    0
NO.YRS      0.00
$PER PERIOD    $0.00
ARROWS MOVE ->, * CALCULATES
```

Once all your data has been entered on the screen, press \* to begin calculations. The answer will appear on the same screen.

If you want a printout of the entire loan schedule, press \* again. If you want to run another loan hit A. The loan schedule is brought up on the display one screen at a time. Scroll the screen by hitting any key. At the end, you can get hard copy by typing H.

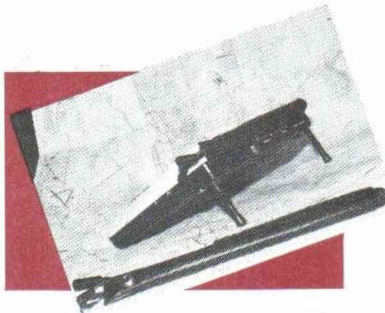
If you don't want the entire loan schedule printed to the screen, press \* again. You are then asked if you want hard copy. So it is possible to get hard copy without having to scroll through several screen fulls of loan payments.

So now you've got it if you need. Next time you do battle with a bank, go in prepared and knowing what to expect. ☐

Please help us rate this article's value. If you've found it very valuable, circle 176 on the Reader Service Card. If it was moderately valuable, circle 177—and if it wasn't valuable to you, circle 178.

# POWER-100 POWER-200

THE IN TECHNOLOGY



60 day money back guarantee — love it or return it!

Recharge with Standard AC adapter — No extra recharger needed!

Attaches securely to computer — Nothing extra to carry

Computer still fits in case with batteries attached — As portable as ever

Recharge while in use — No Downtime!

Powers NEC, Olivetti, Chipmunk, and More!

Normally pays for itself in a few months!

## FEATURES

|                     | POWER 100 | POWER 200 |
|---------------------|-----------|-----------|
| RUN TIME: MODEL 100 | 10 HRS    | 13 HRS    |
| MODEL 200           | 8 HRS     | 11 HRS    |
| WEIGHT:             | 5 OZ      | 7 OZ      |
| LENGTH:             | 10 IN     | 10 IN     |
| RECHARGE 50%:       | 4 HRS     | 4 HRS     |
| RECHARGE 100%:      | 16 HRS    | 16 HRS    |
| PRICE:              | \$39.95   | \$49.95   |

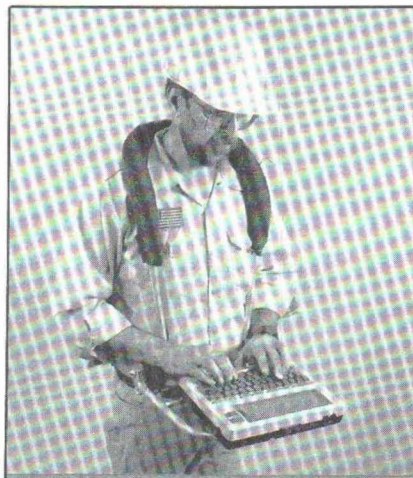
**CALL 1-804-794-6675**

**or write to:**

**A.R.M.S.**

12131 Old Buckingham Rd.  
Midlothian, VA 23113

# New PORTA-PRO



The **PORTA-PRO** is a light weight adjustable frame for lap computers. At last, true mobility. The **PORTA-PRO** is a must for the professional who has already recognized the convenience of a lap computer. The **PORTA-PRO** lets you use your lap computer anywhere.

The **PORTA-PRO** is fully adjustable. The padded, metal frame and secure computer mount is

designed for maximum comfort. Available for the Model 100. Adaptable for other models.

Send \$99.95 plus \$5.00 for shipping.

**HEARTHSIDE ENTERPRISES, P.O. Box 609, No. Amherst, MA 01059**

Name

Street

City  State  Zip



```

1122 IF C>=1 THEN CLS:
PRINT "MONEY WILL LAST FOREVER @ THIS RATE
";
FOR J=0 TO 700:
NEXT J:
X(1)=9999999999:
GOTO 920
1130 X(1)=-1*LOG(1-C)/(X(2)*LOG(1+R))
1140 GOTO 920
1200 PRINT @280," CALCULATE NO OF PERIODS/YR.
";
1201 LC=0
1210 N1=6:
R=X(0)/100
1212 R1=R/N1:
C=X(4)/X(3)*R1
1214 IF C>=1 THEN N1=N1*2:
GOTO 1212
1220 R1=R/N1:
C=X(4)/(X(3)*(1+R1))*R1
1225 IF C>=1 THEN LC=LC+1:
N1=N1+1:
IF LC>22 THEN 1244 ELSE 1220
1230 N2=-1*LOG(1-C)/(X(1)*LOG(1+R1))
1235 LC=LC+1
1240 IF ABS(N2-N1)/N1<0.005 THEN 1250 ELSE N1=(N
2+N1)/2
1244 IF LC>20 THEN CLS:
PRINT " ERROR ERROR":

```

```

PRINT "DID NOT CONVERGE AFTER ";LC:
FOR J=0 TO 600:
NEXT J:
GOTO 920
1245 GOTO 1220
1250 X(2)=INT(N2+.5):
GOTO 920
1300 PRINT @280," CALCULATING AMOUNT OF PAYMENT
";
R=X(0)/100/X(2)
1310 X(3)=X(4)*R/((1-(1+R)^(X(2)*X(1)))/(1+
R)
1320 GOTO 920
1400 PRINT @280," CALCULATING PRESENT VALUE.":
R=X(0)/100/X(2):
R1=(1+R)^(X(1)*X(2))
1410 X(4)=X(3)/R*(1-R1)
1420 GOTO 920
9000 REM DATA INPUT
9001 REM (C) 1983 L.E. SPARKS
9002 REM MAY BE FREELY USED
9010 CLS
9015 PRINT T$
9020 PRINT STRING$(39," ")
9040 FOR J=0 TO NT
9050 PRINT TAB(2) T$(J);TAB(21):
PRINT USING F$(J);X(J)
9060 NEXT J
9065 IF JQ=-9 THEN 9800

```

## Civilize the DISK/VIDEO INTERFACE MAKE SAVAGE THE MODEL 100

NOW AVAILABLE FOR THE MODEL 200

With DISK-BUDDY software for your D/VI, only function keys need touch your disk files!

Twelve programs for one low price, work together to give the TRS-80 Model 100 unique disk file handling abilities. Access disk files from menu, just like a RAM file. Commands you were tediously typing become simple function key selections. And that's just part of the power of the DISK-BUDDY PAK. It does things you can't:

- Create "superfiles" the length of the disk, over 170,000 bytes!
- Print out, or display on either screen, or copy to disk or other device, a disk data file of *any length*, WITHOUT USING ANY ADDITIONAL RAM!
- Furthermore, transfer records can be "filtered," an example:  
An address file on disk can contain more than 1300 entries. You can



move to RAM, or screen, or printer, etc., those records which contain "California" and "Tennis" or whatever. Four logical modes of search are available.

- Also: Features to run, load, save, sort, kill, measure, append, and name, disk files and RAM files, and much more:

PCM Magazine (March, '85) said: "... an excellent buy" ... "manual is extremely well written" ... "will substantially increase the speed and ease of operation of the M-100 with the D/VI."

That was the idea in the first place.

**TO ORDER THE DISK-BUDDY PAK (disk and manual):** Send name, address, and check or money order for \$39.95 plus \$2.00 postage and handling to the address below. (For COD's call: 212-243-2129)



**Buddy Systems**

220 West 24th Street  
New York, NY 10011



## ANNUITIES

```

9070 PRINT @ (JS*40)+JR,"->";
9075 PRINT @280,"ARROWS MOVE ->, * CALCULATES
      M RETURNS";
9080 Y$=INKEY$;
      IF Y$="" THEN 9080
9090 IF INSTR(A$,Y$)<>0 THEN 9500
9095 IF Y$="M" OR Y$="m" THEN JF=-9:
      RETURN
9100 JZ=INSTR(AZ$,Y$);
      IF JZ=0 THEN 9080
9110 ON JZ GOTO 9120,9120,9140,9250
9120 PRINT @ (40*JS)+JR," ";
9122 JS=JS+1;
      IF JS>NT+2 THEN JS=2
9124 PRINT @ (JS*40)+JR,"->";
9130 GOTO 9080
9140 PRINT @ (40*JS)+JR," ";
9150 JS=JS-1;
      IF JS<2 THEN JS=NT+2
9152 PRINT @ (40*JS)+JR,"->";
      GOTO 9080
9250 RETURN
9500 PRINT @ (40*JS)+JR,C1$;
9505 PRINT @280,"ENTER REST OF DATA PRESENTER
      WHEN DONE";
9510 V$=Y$;
9530 PRINT @ (40*JS)+18,V$;CHR$(95);" ";
9540 Y$=INKEY$;
      IF Y$="" THEN 9540

```

```

9550 IF Y$=CHR$(13) THEN 9700
9560 IF Y$<>CHR$(29) THEN 9600
9570 IF LEN (V$)=0 THEN 9530
9580 V$=LEFT$(V$,LEN(V$)-1);
9590 Y$=" ";
      GOTO 9530
9600 IF INSTR(A$,Y$)=0 THEN 9530
9610 V$=V$+Y$;
9620 GOTO 9530
9700 X(JS-2)=VAL(V$)
9710 JS=JS+1;
      IF JS>NT+2 THEN JS=2
9720 GOTO 9010
9800 JQ=0;
      PRINT @280,"PRESS * FOR PAY SCH, A FOR ANO
      THER";
9810 Y$=INKEY$;
      IF Y$="" THEN 9810
9815 IF Y$="*" THEN 9830 ELSE IF Y$="A" THEN 90
34000 DATA ##:###%,##.##,###,###,####,#####.##
      "$$###,#####.###"
35000 DATA INTEREST,NUMBER YRS,NO PERIOD/YR,AM
      T PAYMENT,FUTVAL,END

```

*Listing 3. Loan payment program LOAN.BA.*

```

1 REM LOAN PAYMENT PROGRAM VERSION 1.1.
2 REM 10/83 BY L. E. SPARKS
3 REM FOR TRS-80 MODEL 100

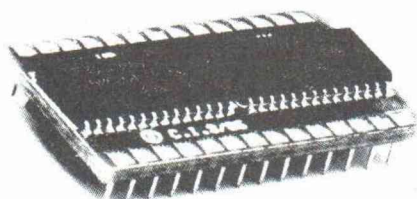
```

## 24K Expansion RAM

For the Model 200

\$125. each

\$240. for two

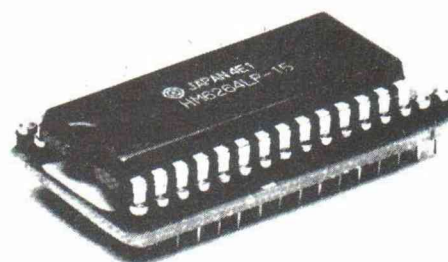


## 8K Expansion RAM

For the Model 100 & 8201

\$27. each

\$75. set of 3



**These Modules are easily user installable  
and they feature:**

- Low Power CMOS Static RAM
- 30 Day Satisfaction Full Refund Policy
- High Quality Sockets
- Instructions Include Test Program Listing
- One Year Warranty

M/C, VISA, Check or Money Order

Shipping-Add \$1.50 UPS Ground

or \$4.00 2nd Day Air.

CA Residents add 6% Sales Tax



**Cryptronics, Inc.**

11711 Coley River Circle, Suite 7  
Fountain Valley, CA 92708  
Phone: (714) 540-1174



## ANNUITIES

```

4 REM WRITTEN IN MICROSOFT BASIC
5 REM FOR TAB BOOKS
9 DEFINT J,N,I:
  CLS
10 CLS
11 A$="1234567890,+--"
12 AZ$=CHR$(13)+CHR$(31)+CHR$(30)+CHR$(42)
14 PRINT STRING$(40," "):
  PRINT"LOAN PROGRAM BY LES."
15 JR=16
30 DIM T$(5),X(5),F$(5),P(90),PI(90),B(90)
35 FOR J=1 TO 5:
  READ F$(J):
  NEXT J
40 J=1
50 READ T$:
  IFT$="END" THEN 70 ELSE T$(J)=T$
60 J=J+1:
  GOTO 50
70 NT=J-1
80 J1=2:
  JS=J1
90 GOSUB 9000
100 REM CHECK TO SEE WHAT IS MISSING
105 JC=0
110 FOR J=1 TO NT:
  IF X(J)=0 THEN JF=J:
  JC=JC+1

```

```

120 NEXT J
130 IF JC=0 THEN CLS:
  PRINT"ERROR YOU HAVE SPECIFIED ALL.":
  PRINT"REENTER DATA":
  FOR J=1 TO 1000:
  NEXT:
  GOTO 90
140 IF JC>1 THEN CLS:
  PRINT"ERROR. TOO MANY UNKNOWN.":
  PRINT"REENTER DATA.":
  FOR J=1 TO 1000:
  NEXT J:
  GOTO 90
150 ON JF GOTO 200,300,400,500,700
200 R=X(2)/100/X(3)
210 R1=1-(1+R)^(X(3)*X(4))
220 R2=R/R1:
  X(1)=INT(X(5)/R2*100)/100
230 GOTO 90
300 R=12/X(3)/100
305 IF X(5)*X(3)*X(4)<X(1) THEN NR=0:
  GOTO 312
310 R1=X(5)*(1-(1+R)^(X(3)*X(4)))/X(1)
312 IF R>0 THEN 320 ELSE CLS:
  PRINT"CANNOT MAKE THIS LOAN."
314 PRINT"INTEREST RATE IS 0 OR LESS."
316 PRINT"PRESS ANYKEY TO CONTINUE."
318 IF INKEY$="" THEN 318 ELSE 90

```

## DON'T MISS THE LATEST ADVANCE IN MODEL 100/TANDY 200 SOFTWARE

**X-TEL™** by the creators of  
TELECOMMUTER™

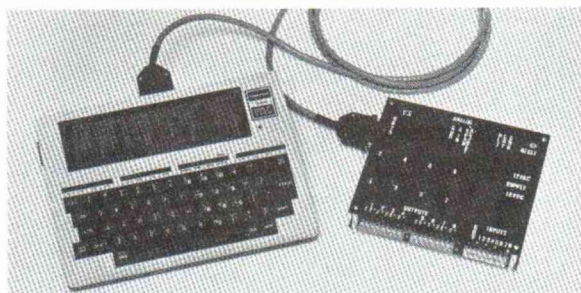
- Use TEXT while online in TELCOM: Download letters and upload a reply in one terminal session
- Exchange .CO, .BA and .DO files with other computers, bulletin boards, and information utilities
- Standard XMODEM error-checking protocol
- List and Kill Files online in TELCOM
- Compatible with Telecommuter and other desktop communications software supporting XMODEM

Specify Radio Shack Model 100 or Tandy 200 computer  
Price: \$50 on MS-DOS diskette or cassette  
MasterCard and Visa accepted.  
Please call or write for further information.

**Siga Systems, Inc.**

19 Pelham Road  
Weston, MA 02193  
(617) 647-1099

**SO SIMPLE**



## REAL WORLD CONTROL

Use the CIP/35A and your MODEL 100/200 for control of home, office, business, security, environment, classroom lab, process control and data acquisition. Plugs into serial port and is easily controlled from BASIC or TELCOM. The CIP/35A is the most cost effective input/output board on the market today and the easiest to use!

### SPECIFICATIONS:

- 8 RELAY OUTPUTS, HIGH CURRENT
- 8 INPUTS, GROUND FOR OPERATION
- 1 - 8 BIT A/D WITH PROVISIONS FOR UP TO 8
- 1 - 8 BIT COUNTER INPUT
- AC OR DC POWER SUPPLY
- SOFTWARE EXAMPLES PROVIDED
- INDUSTRIAL QUALITY
- SHIPPED WITHIN 48 HOURS
- 6 MONTH WARRANTY ON ALL PARTS

**\$199.95**

**SIAS** Engineering, Inc.

RURAL ROUTE 1, SALINA, KANSAS 67401 / (913) 823-8027



## ANNUITIES

```

320 IF ABS(R-R1)/R<=.001 THEN 330 ELSE R=R1
325 GOTO 310
330 X(2)=R*100*X(3)
340 GOTO 90
400 REM CALCULATE NO PERIODS/YR
410 N=1:
  JN=1
420 R=X(2)/100/N
430 R1=1-(1+R)^(N*X(4))
440 XN=X(1)*X(2)/100/(X(5)*R1)
450 JN=JN+1:
  IF ABS(XN-N)/N<=.1 THEN 480
460 N=INT(XN):
  IF JN=12 THEN 470 ELSE 420
470 CLS:
  PRINT:
  PRINT "DID NOT CONVERGE TO NO. PAYMENTS/YR"
472 PRINT "BEST GUESS IS ";INT(XN)
475 PRINT "PRESS ANY KEY TO CONTINUE"
476 Y$=INKEY$:
  IF Y$="" THEN 476 ELSE 90
480 X(3)=INT(XN+.5)
490 GOTO 90
500 REM CALCULATE NO OF YEARS
510 R=X(2)/100/X(3)
520 AR=X(1)*R/X(5)
530 A1=1-AR

```

```

535 IF A1>0 THEN 540 ELSE CLS
536 PRINT "YOU CAN NOT MAKE SUCH A LOAN."
538 PRINT "PRESS ANY KEY TO CONTINUE."
539 INKEY$:
  IF INKEY$="" THEN 539 ELSE 90
540 X(4)=-LOG(A1)/LOG(1+R)/X(3)
550 GOTO 90
700 REM CALCULATE MONTHLY PAYMENT
710 R=X(2)/100/X(3)
720 R2=1-(1+R)^(X(3)*X(4))
730 R2=R2/R
740 X(5)=X(1)/R2
750 X(5)=INT(X(5)*100)/100 'ROUND TO CENT
760 JQ=-9
770 GOTO 90
9000 REM DATA INPUT
9001 REM (C) 1983 L.E. SPARKS
9002 REM MAY BE FREELY USED
9010 CLS
9015 PRINT "LOAN CALCULATOR PROGRAM BY LES"
9020 PRINT STRING$(39," ")
9040 FOR J=1 TO NT
9050 PRINT TAB(2) T$(J);TAB(20):
  PRINT USING F$(J);X(J)
9060 NEXT J
9065 IF JQ=-9 THEN 9800
9070 PRINT @ (JS*40)+JR,"->";
9075 PRINT @ 280,"ARROWS MOVE ->, * CALCULATES";

```

### NEC Starlet™ MEMORY SYSTEMS

#### 3½" FLOPPY DISK DRIVE **\$395**

- 300K USER CAPACITY, CP/M FORMAT
- COMPLETE 8431A EMULATION
- FAST SINGLE/DUAL DRIVE FILE BACKUP AND COPY PROGRAM
- DISK/DRIVE VERIFY PROGRAM
- COMPACT: 2.2" x 4.1" x 6.4"
- POWER AUTOSWITCHED FROM STARLET
- SUPPLIES DC POWER TO STARLET

#### 128K DATAPAC® CARTRIDGE **\$179**

#### 64K DATAPAC® CARTRIDGE **\$119**

- 3 YEAR, USER REPLACEABLE BACKUP BATTERY
- 32K VERSION, 8401A OR 8201A

#### 8K MODULE FOR MODEL 100 8201A AND M-10 **\$22.25 @ 3 \$25**

- Thousands sold, easy installation

**NODE POLICY:**

- 30 day money-back guarantee
- 12 month warranty — 3 day air service
- Free UPS 2ND DAY AIR shipping
- Quantity discounts start at 3 units

PAYMENT: VISA OR MASTERCARD, Checks held 14 days, C.O.D. add \$2, California residents add 6% tax.



Call for immediate delivery (408) 462-3773

**NODE** COMPUTER SYSTEMS

720 CAPITOLA AVE., BLDG. D  
CAPITOLA, CA 95010

STARLET™ is a registered trademark of NEC

### NEW! INTRODUCTORY OFFER

PRESS <CR>

**Only  
\$29.95**

**Model 100 Printing Program  
With Page Display!**

- ✓ Machine-language fast!
- ✓ Parallel and serial printers!
- ✓ Compact: only 3K of RAM
- ✓ Auto line feed with one key press
- ✓ Set top, bottom, left, right margins
- ✓ Tabs, single/double space, page numbers

**MONEY BACK GUARANTEE!**

12/85

#### PARAMOUNT MARKETING, INC.

Box 14123, Tallahassee, FL 32317 (904) 656-1867

☐ Visa ☐ MasterCard ☐ Check or Money Order

Card # \_\_\_\_\_ Exp. Date \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Price per program: \$29.95 + \$2.00 shipping

Circle 31 on Reader Service Card

Circle 45 on Reader Service Card



## ANNUITIES

```

9080 Y$=INKEY$:
  IF Y$="" THEN 9080
9090 IF INSTR(A$,Y$)<>0 THEN 9500
9100 JZ=INSTR(AZ$,Y$):
  IF JZ=0 THEN 9080
9110 ON JZ GOTO 9120,9120,9140,9250
9120 PRINT@ (JS*40)+JR," ";
9122 JS=JS+1:
  IF JS>NT+J1-1 THEN JS=J1
9124 PRINT@ (JS*40)+JR,"->";
9130 GOTO 9080
9140 PRINT@ (40*JS)+JR," ";
9150 JS=JS-1:
  IF JS<J1 THEN JS=NT+J1-1
9152 PRINT@ (40*JS)+JR,"->";
  GOTO 9080
9250 RETURN
9500 PRINT @ (40*JS)+JR," ";
9505 PRINT@280,"ENTER REST OF DATA PRESENTER
  WHEN DONE";
9510 V$=Y$
9530 PRINT@ (40*JS)+18,V$;CHR$(95);" ";
9540 Y$=INKEY$:
  IF Y$="" THEN 9540
9550 IF Y$=CHR$(13) THEN 9700
9560 IF Y$<>CHR$(29) THEN 9600
9570 IF LEN (V$)=0 THEN 9530
9580 V$=LEFT$(V$,LEN(V$)-1):
9590 Y$="":

```

```

  GOTO 9530
9600 IF INSTR(A$,Y$)=0 THEN 9530
9610 V$=V$+Y$
9620 GOTO 9530
9700 X(JS-1)=VAL(V$)
9710 JS=JS+1:
  IF JS>NT+J1-1 THEN JS=J1
9720 GOTO 9010
9800 JQ=0:
  PRINT@280,"PRESS * FOR PAY SCH, A FOR ANOT
  HER";
9810 Y$=INKEY$:
  IF Y$="" THEN 9810
9815 IF Y$="*" THEN 9830 ELSE IF Y$="A" THEN 90
9820 GOTO 9810
9830 REM FIGURE PAYMENT SCHEDULE
9840 REM P(I)=PRINCIPLE PAID/PER
9850 REM PI(I)=INTEREST PAID/PER
9860 REM B(I) = BALANCE LEFT PER PER.
9870 B=X(1):
  PT=0:
  PI=0:
  FOR J=1 TO X(3)*X(4)
9880 PI(J)=R*B:
  P(J)=X(5)-INT(PI(J)*100)/100:
  PI=PI+PI(J):
  PT=PT+P(J):
  B(J)=B-P(J)
9885 B=B(J)

```

“It transforms a rough draft notebook into an elegant machine for generating professional-looking final copy. There is nothing else on the market that comes close to it for speed, size, and power. At \$49.95 plus \$2 shipping, it is an incredible bargain.” —PC 8200 User Monthly

**NEW**

# LAPWORD™

WORD PROCESSOR FOR  
MODEL 100 • MODEL 200 • NEC 8201

Keyboard Cover  
\$19.95  
+ \$2.00 shipping  
and handling

**Program features:** Graph mode, Mail merge, Hanging indents, Page numbering, works on any printer. More than 30 features. 3,240-3,297 bytes.

### TO ORDER:

Send check or money order for \$49.95 plus \$2 for shipping and handling to The Covington Group. Visa and MasterCard accepted. No purchase orders. N.Y. State residents add local sales tax.



**The Covington Group**  
310 Riverside Drive Suite 916  
New York, NY 10025  
(212) 678-0064



## ANNUITIES

```

9890 NEXT J
9900 CLS 'NOW PRINT IT OUT
9910 PRINT " LOAN SCHEDULE "
9920 PRINT@41,"PER PAY$, INT PRIN BA
    L"
9930 FOR J=1TOX(3)*X(4)
9935 PRINTUSING"####";J;
9940 PRINTX(5);TAB(12);INT(PI(J)*100)/100;TAB
    (19);P(J);TAB(27);
9960 PRINTUSING"###.###^####";B(J)
9970 IFINT(J/5)-J/5<>0THEN9990
9975 PRINT@280," PRESS ANY KEY TO CONTINUE *
    RETURNS";
9980 Y$=INKEY$;
    IFY$=""THEN9980
9982 IFY$="*"THEN 10000 ELSE CLS
9984 PRINT@41,"PER PAY$, INT PRIN BAL
    "
9990 NEXTJ
10000 PRINT@280,"PRESS H FOR HARDCOPY * RETURN
    S";
10010 Y$=INKEY$;
    IFY$=""THEN10010ELSEIFY$="*"THEN90ELSEIFY$
    <>"H"THEN10010
10020 CLS
10030 PRINT" READY PRINTER:
    "
10040 LPRINT" OUTPUT FROM LOAN PROGRAM."
10050 LPRINT

```

```

10060 LPRINT"SUMMARY DATA."
10070 LPRINT
10080 FOR J=1TONT:
    LPRINTTAB(5);T$(J);TAB(25);X(J);
    NEXTJ;
    LPRINT
10090 LPRINTUSING" TOTAL INTEREST PAID $$$$$$
    ,###.###";PI
10110 LPRINT
10120 LPRINT"LOAN SCHEDULE"
10130 LPRINT"PERIOD";TAB(12)"PAYMENT";TAB(22)"
    INTEREST";TAB(33);"PRINCIPLE";TAB(45);"
    BALANCE"
10140 FOR J=1TOX(3)*X(4)
10150 LPRINTTAB(3);J;TAB(12);
10160 LPRINTUSING"$$$$$,###.###";X(5);
    LPRINTTAB(25);
10170 LPRINTUSING"$$$$$,###.###";PI(J);
    LPRINTTAB(38);
    LPRINTUSING"$$$$$,###.###";P(J);
    LPRINTTAB(55);
10180 LPRINTUSING"$$$$$,#####.###";B(J)
10190 NEXTJ
10200 GOTO 90
19999 DATA "$$$$$,#####.###",###.###%,###,###.
    ##,"$$$$$,#####.###"
20000 DATA AMTLOAN,INTEREST,PAYMTS/YR,NO.YRS,$
    PER PERIOD,END

```

Limited Time Offer!

## 8K EXPANSION RAM

TRS-80 model 100, NEC 8201

**\$24.<sup>95</sup>**

Set of three \$59.<sup>95</sup>

90 Day Warranty  
Instruction Included  
Easy Installation  
Shipping Included U.P.S.  
C.O.D. Money Order  
Cash only. No charges.

WA Residents add 8.1% sales tax

**AMERICAN  
MICRO SUPPLY, INC.**

2316 - 187th Ave. N.E.  
Redmond, WA 98052  
(206) 746-6158



AMERICAN TECHNOLOGIES INC.

## STATIMATE ON-FLOOR SPC SYSTEM UNDER \$1000

For software AND hardware\*

1. Up to 16 control charts simultaneously
2. Direct gage input
3. All types of control charts
4. Capability Analysis
5. Display screen
6. User friendly
7. Portable
8. Durable
9. Flexible - non dedicated hardware
10. Easy interface with most micros

\*Statimate software from American Technologies Inc. designed to run on Radio Shack Model 100 32K Ram portable computer. Statimate software available separately for \$300.00.

123 South Jefferson • Marshall, Michigan 49068  
(616) 781-3014

Circle 68 on Reader Service Card

Circle 48 on Reader Service Card



**portable**  
100/200/600

## MARKETPLACE

### A Classified Ad Section to serve 100/200/600 users

#### Hardware

FOR SALE — PG Design 32K RAM module, works perfectly, with documentation, \$180. R. Whitehead, 1 Quorn Hunt Road, West Simsbury, CT 06092.

#### Software

8K MEMORY EXPANSION: \$22 each. Model 100, PC-8201. Large stock, fast delivery. S/H Free! Warranty. Send check/ M.O.: Solid Devices, Box 42332-R, Portland, Oregon 97242, (503) 231-7607.

EPROM CAPABILITY FOR MODEL 100 prototypes available. ROM socket to 27C256 Translator. Bare board for loaded, test clip for on-board programming from your programmer. Technology First, 9235 Chesapeake St., Suite B, San Diego, CA 92123.

#### User Groups

Custom medical software for 100/200. Clinical & business programs. Priced from \$39.95. Richard Elliott, MD, 42 Walnut Lane, Davis, CA 95616.

**MARKETPLACE**  
**Portable 100/200/600**  
**P.O. Box 250**  
**Highland Mill**  
**Camden, ME 04843**  
**207-236-4365**

## TELCOM (from page 6)

Tampa 813-877-1127  
Tampa 813-877-6515  
Vero Beach 305-562-1674 S  
West Palm Beach 305-471-9505

**Georgia**  
Athens 404-549-8513 S  
Atlanta 404-325-7293  
Columbus 404-324-7314  
Dalton 404-226-3400 S  
Macon 912-745-9281 S  
Rome 404-235-6031 S  
Savannah 912-232-4481

**Hawaii**  
Hilo 808-935-6494 S  
Honolulu 808-524-8750  
Maui 808-244-3188 S

**Idaho**  
Boise 208-344-5876  
Kellogg 208-784-1111 S  
Nampa 208-467-3326 S

**Illinois**  
Bloomington 309-827-3861  
Chicago 312-726-0350  
Chicago 312-750-0501  
Decatur 217-429-0192  
Deerfield 312-945-5730 S  
Effingham 217-342-9772 S  
Elgin 312-931-4550  
Freeport 815-233-2621 S  
Kankakee 815-933-3974 S  
Macomb 309-833-3530 S  
Morrison 815-772-7251 S  
Peoria 309-637-4033  
Quincy 217-223-6569 S  
Rockford 815-962-5062  
Rolling Meadow 312-259-5890 S  
Schaumburg 312-529-6284 S  
Springfield 217-753-8631 S

**Indiana**  
Anderson 317-643-1292 S  
Bloomington 812-332-4584 S  
Bluffton 219-824-4900 S  
Columbus 812-378-1919  
Crane 812-854-7392 S  
Elkhart 219-295-1550 S  
Evansville 812-464-9376  
Ft. Wayne 219-456-4471  
Ft. Wayne 219-745-5616  
Gary 219-884-6320 S  
Indianapolis 317-631-2635  
Indianapolis 317-634-7200  
Lafayette 317-742-8031 S  
Muncie 317-289-6386  
New Castle 317-521-3904 S  
Richmond 317-962-8556 S  
South Bend 219-234-2931  
Tell City 812-547-6404 S  
Terre Haute 812-235-6021  
Valparaiso 219-462-7527 S

**Iowa**  
Belmond 515-444-3894 S  
Burlington 319-754-8481 S  
Carroll 712-792-9072 S  
Cedar Falls 319-277-4741 S  
Cedar Rapids 319-364-3136  
Davenport 319-324-0590  
Des Moines 515-280-8861  
Dubuque 319-556-7413 S  
Marshalltown 515-752-6776 S  
Sioux City 712-255-9550 S

**Kansas**  
Hayes 913-628-1704 S  
Hesston 316-327-4171 S  
Independence 316-331-2120 S  
Leavenworth 913-682-3317  
McPherson 316-241-0346 S  
Wichita 316-262-0415

**Kentucky**  
Bowling Green 502-842-6136 S  
Lexington 606-253-1556

Louisville 502-589-3820  
Owensboro 502-685-3125 S

**Louisiana**  
Baton Rouge 504-292-8140  
Lafayette 318-233-4510  
Lake Charles 318-439-3681  
Monroe 318-322-0599 S  
New Orleans 504-887-7335  
Shreveport 318-227-9592

**Maine**  
Augusta 207-622-9341  
Bangor 207-947-5231 S  
Brunswick 207-729-5106  
Lewiston 207-784-5701 S  
Portland 207-775-6593

**Maryland**  
Baltimore 301-583-7541  
Hagerstown 301-797-5640 S  
Rockville 301-340-4800  
Rockville 301-340-5096  
Salisbury 301-543-2686 S

**Massachusetts**  
Attleboro 617-226-3119 S  
Beverly 617-927-7047 S  
Boston 617-868-2500  
Boston 617-868-2830  
Fitchburg 617-345-7544  
Framingham 617-877-7800  
Lynn 617-598-7172  
Milford 617-478-3160 S  
North Adams 413-664-6787 S  
Pittsfield 413-494-2351  
Springfield 413-781-5854  
Worcester 617-757-3862

**Michigan**  
Adrian 517-263-7587 S  
Ann Arbor 313-663-6866  
Battle Creek 616-968-0275 S  
Bay City 517-892-0261 S  
Benton Harbor 616-925-9645 S  
Detroit 313-862-0500  
Detroit 313-862-1040  
Flint 313-235-1661  
Grand Rapids 616-459-2205  
Holland 616-392-1982  
Jackson 517-750-4115 S  
Kalamazoo 616-343-0333  
Lansing 517-484-4999  
Muskegon 616-725-9255 S  
Pontiac 313-681-4291 S  
Saginaw 517-752-4195

**Minnesota**  
Duluth 218-722-1855 S  
Mankato 507-388-1605 S  
Minneapolis 612-835-0680  
Minneapolis 612-835-3496  
Owatonna 507-455-1224 S  
St. Cloud 612-253-9706 S

**Mississippi**  
Aberdeen 601-369-6141 S  
Bay St. Louis 601-467-9228 S  
Gulfport 601-864-9244 S  
Jackson 601-948-3193  
Meriden 601-693-5425 S

**Missouri**  
Kansas City 816-472-4425  
Maryville 816-562-2721 S  
Springfield 417-881-2560  
St. Louis 314-534-7000

**Montana**  
Billings 406-252-4430 S  
Butte 406-494-3320

**Nebraska**  
Kearney 308-234-6589 S  
Lincoln 402-474-7084  
Omaha 402-344-0700  
Omaha 402-344-7840



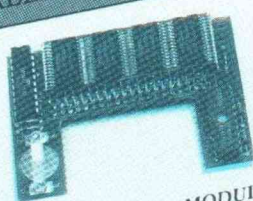
## ADVERTISERS INDEX

### PG# RS# ADVERTISER

|      |    |                        |
|------|----|------------------------|
| 54   | 1  | A & J Micro Drive      |
| 75   | 5  | ARMS                   |
| 17   | 2  | Acroatix               |
| 81   | 68 | American Micro Supply  |
| 81   | 48 | American Technologies  |
| 36   | 3  | Axonix                 |
| 70   | 6  | BKI                    |
| 76   | 4  | Buddy System           |
| 55   | 7  | CISS                   |
| 10   | 8  | CSA Software           |
| 52   | 11 | Cabbage Cases          |
| 53   | 67 | Charge-On              |
| 37   | 61 | Compu-Charger          |
| 63   | 10 | CompuServe             |
| 50   | 9  | Coriolis               |
| 80   | 69 | Covington              |
| 50   | 12 | Covington Group        |
| 77   | 13 | Cryptronics            |
| 49   | 16 | Custom Software        |
| 29   | 14 | Custom Software        |
| 8    | 63 | DCM Data Products      |
| 51   | 15 | DFW Computer Center    |
| 53   | 62 | Data Transfer          |
| 73   | 26 | Data World Products    |
| 69   | 30 | Dresselhaus            |
| 58   | 23 | Economy Computers      |
| 49   | 19 | Elexor                 |
| 51   | 21 | Encompass              |
| CII  | 11 | FACS                   |
| 69   | 20 | Fort Worth Computers   |
| 75   | 74 | Hearthside Enterprises |
| 68   | 24 | Kangaroo               |
| 68   | 18 | Life Sciences Software |
| 54   | 25 | Loquor                 |
| 48   | 64 | MCI Mail               |
| 37   | 43 | MU-PSI                 |
| 48   | 27 | Merritt                |
| CIII | 28 | Micro Peripheral       |
| 58   | 29 | Nictrix                |
| 79   | 31 | Node                   |
| 7    | 33 | P.C.S.G.               |
| 18   | 37 | P.C.S.G.               |
| 25   | 35 | P.C.S.G.               |
| 33   | 36 | P.C.S.G.               |
| 66   | 32 | P.C.S.G.               |
| 60   | 34 | P.C.S.G.               |
| 43   | 41 | P.C.S.G.               |
| CII  | 39 | PG Design              |
| 83   | 38 | PG Design              |
| 4    | 40 | PIC                    |
| 79   | 45 | Paramount Marketing    |
| 12   | 44 | Polar                  |
| 59   | 53 | Pomerleau              |
| 26   | 42 | Portable Basics        |
| 35   | 17 | Prairie Power          |
| 30   | 49 | Purple Computing       |
| 55   | 46 | Purple Computing       |
| 52   | 70 | RMD & Associates       |
| 39   | 54 | Radio Shack            |
| 65   | 47 | Radio Shack            |
| 46   | 56 | Radio Shack            |
| 71   | 59 | Rainbow Computers      |
| 78   | 71 | Sias                   |
| 78   | 50 | Sigea                  |
| 22   | 51 | Sigea                  |
| 56   | 52 | Softmate               |
| 57   | 66 | Tab Books              |
| 59   | 60 | Technology First       |
| 72   | 65 | Time-Soft              |
| 15   | 55 | Touchbase              |
| CIV  | 72 | Traveling Software     |
| 21   | 58 | Traveling Software     |
| 1    | 57 | Traveling Software     |
| 57   | 73 | United Management      |

# The Number One Choice

PG Design RAM modules have become the number one choice for Model 100, Tandy 200 users, not just because more people are using PG Design RAMs than any other brand—But because our name has become synonymous with **PREMIUM QUALITY, RELIABILITY, and IMMEDIATE CUSTOMER SERVICE.**



MODEL 100 64K RAM MODULE



MODEL 100 8K RAM MODULE



TANDY 200 24K RAM MODULE

When you purchase any **PG Design** RAM module, you're buying directly from the people who design, manufacture and service the product.

We develop the most advanced products of their kind by using the latest technology and the highest quality components available. Before we bring any product to market, it is carefully evaluated in the field by professionals. If it doesn't meet their standards, it doesn't meet ours. And when we finally bring our product to market, it's the finished product. It works as we say it will, and it will keep on working reliably. "Our reputation for excellence is riding on each and every RAM module we ship."

Whether it's an 8K or 64K RAM module to expand the memory of your Model 100 or a 24K RAM module for your Tandy 200, be assured you are buying the best when you buy **PG Design** RAM modules.

**Model 100**  
64K RAM module—\$375 ea. 32K RAM module—\$250 ea. 32K upgrade—\$150  
8K RAM modules—\$29.95 ea. Set of three \$84.00 (available for NEC 8201A)

**Tandy 200**  
24K RAM modules—\$139 ea. \$135 ea. two or more

We absolutely guarantee the quality and perfect performance of all **PG Design** RAM modules or your money back!

We supply easy to follow instructions with each of our products. And, we are eager to assist you on the phone if you should need help with the installation or operation of your RAM module.

To order, call us (313/727-2744), or write. All orders are shipped within five working days after receiving your order. We accept VISA, Master Card, personal checks or money orders.

**PG Design Electronics, Inc.** 66040 Gratiot, Richmond, Michigan 48062 (313) 727-2744  
Dealer inquiries invited. TANDY is a registered trademark of TANDY CORP.

# PG Design



## Nevada

Las Vegas 702-382-6810  
Reno 702-323-1671

## New Hampshire

Concord 603-224-1916 S  
Keene 603-352-1678 S  
Manchester 603-668-7671 S  
Nashua 603-889-3450

## New Jersey

Basking Ridge 201-766-5282 S  
Hackensack 201-489-0220  
Hackensack 201-489-0570  
Heightstown 609-448-6100 S  
Kearney 201-997-7735  
Merchantville 609-234-9588  
Moorestown 609-234-9588  
Morristown 201-285-1715  
Morristown 201-285-1870  
Morristown 201-326-7002  
New Brunswick 201-249-4187  
New Brunswick 201-846-8560  
Pitman 609-589-6874 S  
Plainfield 201-755-0774 S  
Princeton 609-924-6960  
Rahway 201-381-5044  
Summit 201-522-0300

## New Mexico

Albuquerque 505-843-7790  
Carlsbad 505-887-5564 S  
Hobbs 505-393-1771 S  
Santa Fe 505-982-4293 S

## New York

Amsterdam 518-842-4720 S  
Auburn 315-255-2761  
Binghamton 607-772-8200  
Buffalo 716-882-0112  
Corning 607-937-8391  
East Hampton 516-324-5002 S  
Elmira 607-734-3944 S  
Maybrook 914-427-2848 S  
Mineola 516-294-9170  
New York 212-766-9701  
New York 212-962-6721  
Niagara Falls 716-284-3771  
Norwich 607-336-1856 S  
Oneonta 607-432-8622 S  
Port Chester 914-939-6226  
Port Jefferson 516-928-9033 S  
Poughkeepsie 914-454-0890  
Rochester 716-546-7600  
Rochester 716-546-8200  
Schenectady 518-385-0241  
Schenectady 518-385-1931  
Syracuse 315-478-7005  
Utica 315-797-6550  
West Babylon 516-789-2450  
Woodstock 914-679-8987 S

## North Carolina

Asheville 704-258-8396 S  
Brevard 704-883-8275 S  
Burlington 919-227-9031 S  
Charlotte 704-372-0500  
Durham 919-683-1924 S  
Elon College 919-584-7025 S  
Gastonia 704-867-1285 S  
Greensboro 919-275-0940  
Hendersonville 704-692-0517 S  
High Point 919-886-5038 S  
Monroe 704-289-5591 S  
N. Wilkesboro 919-838-2461 S  
Raleigh 919-834-5747  
Salisbury 704-637-6073 S  
Wilmington 919-763-3605  
Winston-Salem 919-788-6727

## North Dakota

Underwood 701-442-3261

## Ohio

Akron 216-535-1594  
Alliance 216-821-9980 S  
Athens 614-592-3058 S  
Canton 216-453-3374 S  
Cincinnati 513-721-5599

Cleveland 216-362-8300  
Cleveland 216-362-8350  
Columbus 614-263-5282  
Coshoccon 614-622-0011  
Dayton 513-223-7174  
Elyria 216-323-5902 S  
Hicksville 419-542-8535 S  
Lorain 216-933-4600 S  
Middletown 513-424-5358 S  
Newark 614-345-6622 S  
Sandusky 419-625-4746 S  
Seville 216-769-4487 S  
Springfield 513-323-3037 S  
Toledo 419-255-6516  
Troy 513-339-2684 S

## Oklahoma

Bartlesville 918-336-1493  
Duncan 405-255-8489 S  
Oklahoma City 405-521-8577  
Oklahoma City 405-525-9512  
Pryor 918-825-5185 S  
Tulsa 918-664-1090  
Tulsa 918-664-4510

## Oregon

Eugene 503-485-2343  
Portland 503-287-9045

## Pennsylvania

Allentown 215-439-0278  
Brookville 814-849-5289 S  
Butler 412-283-1111 S  
Coatesville 215-384-6050 S  
Erie 814-453-3641  
Harrisburg 717-233-1465  
Lancaster 717-299-1022 S  
New Kensington 412-339-5500 S  
Norristown 215-277-4030  
Philadelphia 215-284-9310  
Philadelphia 215-284-9343  
Pittsburgh 412-261-3465  
Pittsburgh 412-261-5035  
Scranton 717-348-2121 S  
Selinsgrove 717-374-1104  
Williamsport 717-327-8242 S  
York 717-846-3154 S

## Rhode Island

Providence 401-351-0840

## South Carolina

Aiken 803-648-2694  
Anderson 803-225-4393  
Charleston 803-722-2781  
Clemson 803-654-9232 S  
Columbia 803-256-9642  
Duncan 803-877-6660 S  
Florence 803-662-4519  
Greenville 803-235-8871  
Greenwood 803-223-3827 S  
Spartanburg 803-585-7952  
Sumter 803-773-5425 S

## South Dakota

Rapid City 605-348-8545  
Sioux Falls 605-334-7727

## Tennessee

Brownsville 901-772-4500 S  
Chattanooga 615-265-2920  
Clarksville 615-648-0621 S  
Elizabethton 615-543-3662 S  
Jackson 901-423-4404  
Jefferson City 615-475-3808 S  
Johnson City 615-928-7196 S  
Kingsport 615-247-7444  
Knoxville 615-546-7595  
Memphis 901-527-2636  
Nashville 615-383-6631

## Texas

Abilene 915-695-1900  
Amarillo 806-372-2403  
Austin 512-476-6046  
Big Springs 915-267-5257 S  
Bishop 512-584-3557 S  
Brownsville 512-542-9175

Bryan 409-822-7391 S  
Commerce 214-886-2148 S  
Corpus Christi 512-888-4421  
Dallas 214-638-0123  
Dallas 214-638-1227  
El Paso 915-532-1631  
Fort Worth 817-831-0461  
Galveston 409-763-6414 S  
Harlingen 512-425-7183 S  
Houston 713-223-5474  
Houston 713-229-0154  
Levelland 806-894-1553 S  
Longview 214-757-9490 S  
Lubbock 806-763-2351  
Midland 915-683-9744  
Pampa 806-665-5705 S  
Port Lavaca 512-552-7535 S  
Port Neches 409-727-3591 S  
San Angelo 915-653-2408 S  
San Antonio 512-225-8787  
San Antonio 512-226-6513  
Seminole 915-758-9258  
Snyder 915-573-1685 S  
Terminal 915-563-3970 S  
Tyler 214-595-2465  
Victoria 512-576-1123  
Waco 817-776-5860

## Utah

Brigham City 801-734-9423 S  
Clearfield 801-773-9690 S  
Lindon 801-785-7273 S  
Salt Lake City 801-363-5503

## Vermont

Brattleboro 802-254-8764  
Burlington 802-658-0110

## Virginia

Blacksburg 703-552-7668 S  
Bristol 703-466-5952 S  
Charlottesville 804-971-3641  
Chester 804-748-6373 S  
Fredericksburg 703-371-4902 S  
Herdon 703-437-8600 S  
Lynchburg 804-528-3626  
Newport News 804-244-3066 S  
Norfolk 804-625-3079  
Richmond 804-359-6940  
Roanoke 703-774-2427  
Waynesboro 703-949-7411

## Washington

Everett 206-355-2511 S  
Kennewick 509-735-3579  
Olympia 206-943-0641  
Seattle 206-292-6770  
Seattle 206-292-6930  
Spokane 509-534-1830  
Tacoma 206-272-2035  
Vancouver 206-693-3029 S

## West Virginia

Beckley 304-255-5226 S  
Charleston 304-345-3150  
Shepherdstown 304-876-2537 S  
Wheeling 304-232-8600 S

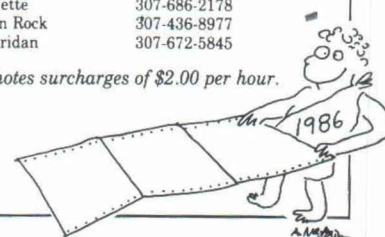
## Wisconsin

Appleton 414-739-0244  
Green Bay 414-432-4144 S  
Lacrosse 608-782-0095 S  
Madison 608-271-8708  
Marinette 715-735-6604 S  
Milwaukee 414-769-5700  
Racine 414-637-9721

## Wyoming

Gillette 307-686-2178  
Glen Rock 307-436-8977  
Sheridan 307-672-5845

S denotes surcharges of \$2.00 per hour.







*the Black Jack™*

For OEM/Dealer/Distributor pricing,  
Contact:

**the microperipheral corporation**

2565 152nd Avenue NE Redmond, WA 98052 (206) 881-7544

## DON'T GAMBLE ON ANYTHING ELSE!

Have you ever been dealt out of telecommunications in hotels, offices, and other locations while on the road?

Why gamble on finding a modular (RJ-11C) phone jack that accepts your direct connect modem?

Deal yourself a winning hand with the Black Jack, the portable modular jack for modems on the go.

- 0-9600 baud
- Fits standard telephone handsets
- Preserves line sensitivity
- Direct connection, not acoustical
- Improved telecommunications
- Insensitive to environmental noise
- Weighs less than ¼ lb.
- Fits easily into a briefcase
- Compatible with Group 3 facsimile equipment

Circle 28 on Reader Service Card



Did you think we were content to stop  
with the **ULTIMATE ROM?**

Introducing . . .

# THE ULTIMATE ROM II

HOLIDAY  
SPECIAL  
\$199.95  
(\$49 UPGRADE!)



Now Includes  
80-Column Display  
in TEXT, TELCOM, and BASIC

## WE SET THE STANDARD!

With the Ultimate ROM, Traveling Software set the standard for packing the most powerful software applications into a single ROM chip. Now with the ULTIMATE ROM II, we are pushing that standard to a new limit.

**INTRODUCING T-WORD AND ROM-VIEW 80** The ULTIMATE ROM II offers T-Word, a complete word processing system--the fastest yet produced for the Model 100/200 or the NEC PC-8201--and our new ROM-VIEW 80 display-enhancement program.\* ROM-VIEW 80 provides an 80-column display option that works with BASIC, TEXT, and TELCOM. And yes, ROM-VIEW 80 does provide full text-editing functions while in 80-column model! Also included are turbo-charged versions of our popular T-base relational database (rated the number one database for the Model 100 and NEC PC-8201) and the best-selling IDEA! outline processor.

**\$49 UPGRADE POLICY!** If you already own the amazing ULTIMATE ROM, you may return it for the ULTIMATE ROM II for only \$49. There are two easy ways to upgrade. Call us on our toll-free number for details.

**\$100 ROM TRADE-IN ALLOWANCE** If you are not totally satisfied with a ROM product purchased from someone else, Traveling Software will allow you a full \$100 credit toward the purchase of the ULTIMATE ROM II. Just give us a call toll-free to see if the product you own qualifies. (Offer good only until January 31, 1986)

**30-DAY MONEY-BACK GUARANTEE** Traveling Software is so sure you'll like the ULTIMATE ROM II we are offering a 30-day money-back guarantee--no questions asked. If you are not completely satisfied with the ULTIMATE ROM II, just send it back and we will give you a full refund.

Order now to take advantage of our holiday special of only \$199.95. After January 31, 1986, the price goes to \$229.85. To order, call us toll-free:

**1-800-343-8080**

## On ULTIMATE ROM II

### ROM-VIEW 80

Works with TEXT, TELCOM, BASIC  
Full text-editing in 80 columns  
Right margin can be set 10-80 columns  
60-column window with scrolling to 80 columns  
Allows 80-column communications in TELCOM

### T-WORD

Fast text-editing enhancements like  
overwrite, word count, search and  
replace  
Fast text-formatting with page plotting  
Merges up to 99 items into boilerplate  
documents  
Allows entry of printer controls like  
boldface, underline, condensed, etc.

### IDEA!

Fast new version!  
New features, including optional IBM  
import/export ThinkTank converter

### T-BASE

Dramatic new speed for file borrowing  
and calculations  
New features, including advanced math  
calculations

### TANDY PORTABLE DISK DRIVE GATEWAY

Built-in support for T-Word to access  
the new \$199 Tandy portable disk  
drive

Also available at Radio Shack Stores through Express Order. Ask for catalog number 90-0409 (Model 100) or 90-0410 (Model 200). \* ROM-VIEW 80 is not available at this time for the Tandy Model 200. A T-base database builder has been added in its place. Trademarks: ThinkTank, Living Videotext, Inc.; Guardian ROM, PEAC Engineering.



Traveling Software, Inc.  
11050 Fifth Ave. NE  
Seattle, WA 98125  
(206) 247-0000